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ORIGINAL ARTICLES.

THE SUN: ITS PLACE IN THE TREATMENT AND PROPHYLAXIS OF TUBERCULOSIS.

By A. ROLLIER,

M.D.,

Director of Clinics for Tuberculosis, Leysin, Switzerland; author of
"La Cure de Soleil," etc.

CERTAIN forms of radiant energy, notably the ultra-violet rays and the X rays, have by this time won considerable reputation in therapeutics; sunlight, in comparison with these radiations, has received but little attention. The causes for this neglect are not easy to determine, and one is almost driven to the opinion that man has not yet entirely broken free from the idea that there is a particular virtue in rarity. The prescriptions of the medieval physicians contained such ingredients as the tongues of adders and the skins of toads; we now know that air and water (with a little soap) are much more useful guardians of health than a whole pharmacopoeia. It will be my endeavour in the present article to show that sunlight is another cheap and universal tonic deserving of much wider application than is at present the case.

The sun has not, however, passed entirely unnoticed throughout the ages, and even writers on medical subjects in classical antiquity made frequent references to the therapeutic action of the sun. Thus Herodotus declares the exposure of the body to the sun to be eminently necessary for people wishing to recover their health and to strengthen their bodies. This writer also forestalls us by a considerable number of years in pointing out the danger of exposing cachectic patients to

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the sun's rays during the heat of summer. The Dark Ages not unnaturally saw heliotherapy sink into disfavour, and it was not until the latter part of the eighteenth century that sunlight began again to interest the medical profession.

In 1774 Faure made use of the sun's rays in the treatment of ulcers. The last years of the eighteenth, and the first half of the nineteenth, century saw the publication of a number of works on this subject, and in 1845 Bonnet, in his "*Traité des Maladies des Articulations*," mentions insolation as the method of choice in the treatment of surgical tuberculosis; he advocated not only local but also the general



FIG. 1.—PATIENT AGED 15. TUBERCULOSIS OF FOOT AND OF KNEE.

Five operative interventions have resulted in thirteen sinuses and ankylosis.

application of the sun's rays with the object of improving the general health of the patient, but he was not able to put his ideas into practice himself. They were taken up again by his successors at Lyons, notably by Poncet, who advocated local exposure to the sun for certain cases of tuberculous arthritis, and applied this kind of insolation as far as it was possible in the foggy climate of Lyons.

The coming of antiseptics extended the range of surgery to tuberculous lesions of bones and joints, and made possible the brilliant work of my much respected teacher, Theodor Kocher. During the 4½ years of my assistantship at Berne, I had ample opportunities of seeing the operative treatment of surgical tuberculosis at its best. Although the operations were admirably performed, and the immediate results good, the number of cases in which recurrence occurred was disquieting. Successive excisions of two or more joints were much too common. I rapidly became convinced that tuberculosis was essentially

a constitutional disease, commanding general treatment, and that, as such, it could not be extirpated locally.

In 1902 Bernhard, of Samaden (Engadin), seeing that meat was preserved from putrefaction by exposure to the sun, decided to try the treatment by insolation for wounds. In the following year (1903) I opened, at Leysin, the first clinic for the systematic treatment of surgical tuberculosis by heliotherapy. From the first I considered the action of sunlight upon the whole surface of the body as of greater importance than the direct effect on the tuberculous lesion. During the first few years we used plaster for immobilization, and performed a



FIG. 2.—THE SAME PATIENT EIGHTEEN MONTHS LATER.

Both joints healed, all sinuses closed. Flexion of knee possible through 130° .
Great improvement of general health.

certain number of excisions. It soon became evident, however, that we had underestimated the efficacy of the new treatment; operative interventions became more and more rare, and plaster was finally abandoned in favour of apparatus which provided sufficient immobility without interfering with the access of air and sun to the affected part.

The aim of heliotherapy is to place the debilitated body of the patient in an environment which will in the highest degree favour the recovery of general health; by this means the resistance of the body to tuberculosis is increased. The sunbath is by no means the only factor of importance in this environment, since in the system of treatment known under the name of heliotherapy great importance is also given to fresh air, which is not only breathed day and night, but comes into intimate contact with the whole surface of the body during a large part of the day. Diet and hygienic habits of life also have their importance.

The action of the sunbath on the human body is a complex and as yet but imperfectly understood problem in which subjective as well as objective phenomena are of importance. The subjective reactions of a patient rarely receive the attention they merit in textbooks of surgery, and the reader in his zeal to master the details of splints and other appliances is apt to lose sight of the mental condition of the patient, although in tuberculosis this is not infrequently the determining factor in the case.

Sunshine is closely associated with happiness, and a contented disposition is conducive to good digestion, sound sleep, and eventually to the complete recovery of health. I therefore offer no apology for placing euphoria among the useful actions of the sunbath. The local action of heliotherapy on the tuberculous lesion is closely akin to its general action; we almost invariably find that painful symptoms soon disappear even in cases in which rest alone has been insufficient to produce the effect.

One of the most striking objective phenomena of the sunbath is the effect on the skin. The habit of wearing clothes over the greater part of the surface of the body results in anæmia and atrophy of the skin; vaso-motor reflexes become sluggish through disuse, and great susceptibility to heat and cold results. Under the influence of sunlight the skin becomes more vascular, better nourished, and thicker; the vasomotor mechanism recovers so far that the skin of the whole body is able to tolerate ranges of temperature which would be acutely uncomfortable to the uninitiated. Another interesting reaction caused by sunlight is cutaneous pigmentation. Pigment not only protects the skin against acute sunburn, but also appears to give it an increased resistance against such cutaneous infections as acne, which are practically unknown among our patients. The sun also possesses a remarkable action on the muscles, which invariably develop rapidly even when the patient is completely bedridden. The tonic action of the sun is also seen in the stimulation of the appetite and of the digestive functions.

The local action of the sun on the tuberculous lesion is also of great importance. The bactericidal action of sunlight has long been known and has been made use of from the earliest times for disinfecting purposes. This action is of great use in superficial wounds and ulcers, as the "Solar dressing" fulfils in the highest degree the demands of modern surgery. Although powerful as an antiseptic, sunlight, in reasonable doses, stimulates the reparative activity of living cells while accelerating the destruction of those which are too badly damaged to survive. A varicose ulcer well illustrates this action of the sun; the surface rapidly becomes healthy in appearance and cicatrization follows.

The fact that the sun's rays are able to influence deeply seated



FIG. 3.—VERY ACTIVE SPINAL CARIES, WITH COMMENCING PARAPLEGIA.



FIG. 4.—THE SAME PATIENT, EIGHTEEN MONTHS LATER, COMPLETELY HEALED.
Correction of deformity and development of good muscular corset to support column.

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lesions will be brought home forcibly to anyone who applies too large a dose of sunlight to a patient whose disease is still in the active stages. Half an hour's exposure of the feet of an uninitiated patient, suffering from tuberculous peritonitis, may be sufficient to produce a violent local reaction, accompanied by severe abdominal pain, and a sharp rise in temperature. In order to avoid such accidents, it has been necessary to evolve a somewhat detailed technique, as the best results are obtained with slight, almost imperceptible, reactions, frequently repeated.

The Technique of Heliotherapy.

It is necessary in the first place to estimate the degree of tolerance of the patient; for this purpose gradual progression and strict individualization are necessary. As the violence of a reaction is largely dependent on the distance of the lesion from the insulated part of the body surface, it is natural to begin with the exposure of the extremities; should the lesion be situated in any of the limbs, it must remain covered until the rest of the body has been exposed. The following table illustrates our method of progressive insolation as applied to a fresh case :

TIME TABLE INDICATING STAGES IN PROGRESSIVE INSOLATION.

	<i>Days of Exposure to Sunshine.</i>					
	1st	2nd	3rd	4th	5th	6th
<i>Part of Body Exposed.</i>	<i>Time in Minutes.</i>					
Feet	5	10	15	20	25	30
Legs	—	5	10	15	20	25
Thighs	—	—	5	10	15	20
Abdomen	—	—	—	5	10	15
Chest	—	—	—	—	5	10
Back	—	—	—	—	—	5

The above table must not be looked on as rigid and invariable, but as subject to considerable modification in individual cases. For instance, cases which give a moderate reaction on short exposure should be treated with great caution; cases of peritonitis and pulmonary tuberculosis always require very gradual and circumspect treatment; and, of course, cases of spinal caries, hip disease, or tuberculosis of the knee, cannot be turned so as to expose the back until a certain degree of recovery has been attained. The following general rule forms a good guide to treatment: The weaker the body of the patient,

the more violently are temperature, pulse, and respiration influenced by the sun, and the greater is the indication for caution. In cases in which the lesion is large and active, and where there is mixed infection with a tendency to retention and intoxication, the sunbath must often be greatly reduced, and not infrequently temporarily abandoned.

In determining the dose of sunlight to be applied, allowance has to be made not only for the individual characteristics of the patient, but also for the various atmospheric conditions, of which the intensity



FIG. 5.—PATIENT AGED 20. TUBERCULOUS DISEASE OF WRIST WITH RECURRENCE AFTER OPERATION.

Peritonitis and pulmonary tuberculosis. Habitus phthisicus.

of the solar radiations and the temperature of the air are the most important. The Alpine winter climate is perhaps the most favourable for heliotherapy, as it combines a high intensity of solar radiations with still and cold air; under such circumstances the sunbath has the desired bracing effect, and may be employed for a comparatively long time. In warm states of atmosphere, and particularly in thundery weather, greater caution is necessary, as under such conditions the sunbath is liable to be enervating. Such an action is entirely the opposite of that desired in heliotherapy. For this reason

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we make a point of arranging that sunbaths in summer are given very early in the morning—*e.g.*, from 6 a.m. to 9 a.m. It has been suggested that the sunbath is dangerous in cases of pulmonary tuberculosis with tendency to hæmoptysis. I have had occasion to treat several hundreds of patients with concomitant tuberculous lesions with involvement of the lungs, and have never observed any accident of this nature which could be attributed to heliotherapy. It is quite possible for the pulmonary tuberculosis occurring at the same time as “surgical” tuberculous lesions to tend to be of a benign type. I am, however, of



FIG. 6 —THE SAME PATIENT ONE YEAR LATER.
All lesions healed. Reconstruction of general health.

opinion that, even in pure pulmonary cases, heliotherapy, properly applied, would never have a congestive action on the lungs. Such accidents as have occurred I believe to be due, chiefly, to failure to recognize the profound effect which insolation (even of the extremities) may have on a tuberculous lesion in the lungs. In hot and thundery weather insolation can in no case be of advantage, and may be positively dangerous to a patient with pulmonary tuberculosis. While pulmonary tuberculosis is to be considered rather as an indication than a contra-indication to heliotherapy, there are other diseases which make this form of treatment undesirable; of these the following are

the most important: uncompensated valvular lesions of the heart, severe myocarditis, advanced arteriosclerosis, and renal insufficiency. With recent pleural effusions and in certain rare cases of very painful peritonitis it is advisable to delay the application of heliotherapy.

While strongly condemning operative measures when used as the principal form of treatment for surgical tuberculosis, I think they may be made to serve a useful though subordinate rôle in the helio-alpine treatment of surgical tuberculosis. With very few exceptions, closed lesions should not be incised; abscesses which remain stationary or tend to increase may be aspirated, but care must be taken to insert the aspirating needle through healthy skin and at some distance from the

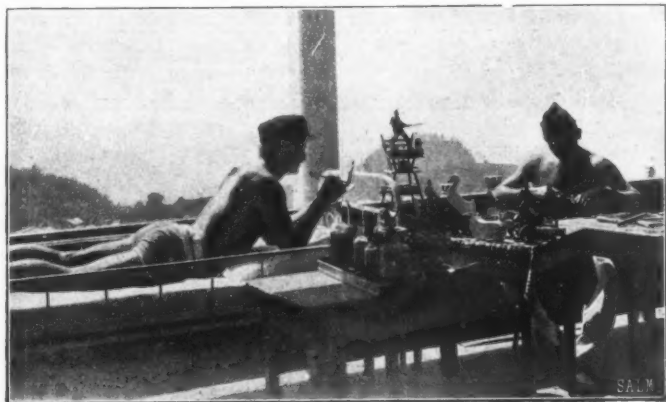


FIG. 7.—PATIENTS AT WORK IN THE SUN AT LEYSIN.

most salient point. Small and medium-sized sequestra are usually absorbed without difficulty during treatment, but large extra-articular sequestra may demand removal by operation. Excisions are hardly ever necessary at the present time, though certain torpid cases of tuberculosis of the knee-joint, in which ankylosis is inevitable, may be advised to undergo this operation. On account of its comparative quick results the social indication for resection is unfortunately not infrequent in our Swiss valleys. In such cases we prescribe a few months' heliotherapy both before and after the operation. But the danger of a recurrence of the disease in the other knee is always to be feared, and here we as a rule succeed in avoiding intervention, and hardly in 1 per cent. of our cases have we been obliged to practise resection. Unilateral tuberculosis of the kidney almost always demands operation, owing to the danger of the spread of infection to the bladder or the other kidney.

When retention of pus and rise of temperature occur in cases complicated by mixed infections, conservative measures, such as dilatation of the sinus with laminaria, should first be tried, but if these fail better drainage must be obtained by operative means. When sequestra are present in septic cases, it is a good plan to delay operation for some months to allow sharper demarcation to take place; the risk of too early operation is that the boundary between diseased and healthy bone is difficult to determine, and there is danger of a spread of the infection further into the healthy though atrophied bone tissue.

TABLE I.—GIVING STATISTICS OF CASES TREATED AT LEYSIN
FROM 1903 TO 1913 INCLUSIVE.

<i>Form of Tuberculous Lesion.</i>	<i>Healed.</i>	<i>Improved.</i>	<i>Stationary or Worse.</i>	<i>Deceased.</i>	<i>Total.</i>
Spinal caries:					
(a) Without mixed infection	151	12	2	2	170
(b) With mixed infection ...	17	6	3	2	28
Tuberculosis of pelvic bones (twenty-one mixed infection)	25	1	6	5	37
Hip disease (thirty-nine mixed infection)	125	21	5	7	158
Tuberculosis of knee (twelve mixed infection). Seventy- eight cases healed with return of articular function	106	8	3	1	118
Tuberculosis of foot (forty-two mixed infection)	87	4	2	1	94
Tuberculosis of shoulder (five mixed infection)	8	4	—	—	12
Tuberculosis of elbow (fifteen mixed infection)	28	2	—	—	30
Tuberculosis of hand (twenty- five mixed infection)	48	2	1	2	53
Tuberculous peritonitis (twenty- nine mixed infection)	79	11	5	7	102
Uro-genital tuberculosis ...	39	20	6	1	66
Tuberculous adenitis (thirty- eight mixed infection)	122	7	6	1	136
Tuberculous osteitis (forty-nine mixed infection)	73	8	2	2	85
Other localizations	33	5	—	—	38
Total	944	111	41	31	1,127
Percentage	83.6	9.8	3.6	2.7	—

The true test of any system of treatment lies in its clinical results. In this respect there can be no comparison between the non-operative helio-alpine treatment and the older operative measures. Not only is the mortality in all but very advanced cases almost negligible (meningitis

less than 1 per cent.), but the local result is much better, showing a high proportion of return of articular function and absence of disfiguring scars. The greatest advantage of heliotherapy is, however, the permanence of the result; insolation and general treatment carried out systematically for a number of months raise the bodily resistance to tuberculosis to such a degree that recurrence of the disease is not at all common. A thorough disinfection of the tissues may be said to have taken place.

The table on page 10 (Table I.) provides in concise form a statistical return of our cases at Leysin from 1903 to 1913.

Our last statistics may appear less favourable than the previous ones. This is owing to the war, many patients having been unable to undergo treatment during those years, and their condition having been badly influenced by privations before they could be brought here. On the other hand, many patients had to leave when the war broke out or soon afterwards, and were not able to wait for their recovery.

TABLE II.—GIVING STATISTICS OF CASES TREATED AT LEYSIN
FROM 1914 TO 1920 INCLUSIVE.

<i>Form of Tuberculous Lesion.</i>	<i>Healed.</i>	<i>Improved.</i>	<i>Stationary or Worse.</i>	<i>Deceased.</i>	<i>Total.</i>
Spinal caries:					
(a) Without mixed infection	205	47	10	12	274
(b) With mixed infection ...	30	31	16	19	96
Tuberculosis of pelvic bones (twenty-two mixed infection)	32	11	2	1	46
Hip disease (forty-four mixed infection)	92	27	6	5	130
Tuberculosis of knee (40 mixed infection)	166	56	6	5	233
Tuberculosis of ankle-joint ...	44	8	2	2	56
Tuberculosis of foot ...	61	10	0	1	72
Tuberculosis of shoulder ...	—	—	—	—	—
Tuberculosis of elbow (twenty- four mixed infection)	22	7	2	—	31
Tuberculosis of hand ...	42	31	1	3	77
Tuberculous peritonitis ...	118	45	14	17	194
Uro-genital tuberculosis ...	88	65	14	21	188
Tuberculous adenitis ...	286	65	10	5	366
Tuberculous osteitis (five peri- ostitis)	60	17	2	2	81
Total	1,246	420	85	92	1,844
Percentage	67.6	22.8	4.6	5.0	—

It will be seen from Table II., that whereas the mortality and the unimproved rates are low, a considerable number of patients left with-

out being completely healed; this is largely due, besides the cause of the war, to the fact that we have a somewhat stricter conception of the meaning of the word "healed" than many of our patients. To be classed in the first column a patient suffering from osteo-articular tuberculosis must be both clinically and radiographically healed. Our clinics contain private patients almost exclusively, and quite a number of them leave on their own responsibility before we are satisfied as to the complete arrest of the disease.

With regard to the return of articular function, we have obtained the following results:

TABLE III.—INDICATING STATISTICS RELATING TO RESULT OF TREATMENT ON ARTICULAR MOVEMENTS.

<i>Form of Tuberculous Lesion.</i>	<i>Cases.</i>	<i>Complete.</i>	<i>Reduced.</i>	<i>Ankylosis.</i>
Tuberculosis of hip (closed)	58	20	24	14
Tuberculosis of hip (with mixed infection) ...	34	4	12	18
Tuberculosis of knee (closed)	138	59	44	35
Tuberculosis of knee (with mixed infection) ...	28	6	3	19
Tuberculosis of ankle	44	24	12	8
Tuberculosis of shoulder	—	—	—	—
Tuberculosis of elbow (twenty-four out of thirty-one with mixed infection)	—	8	11	7

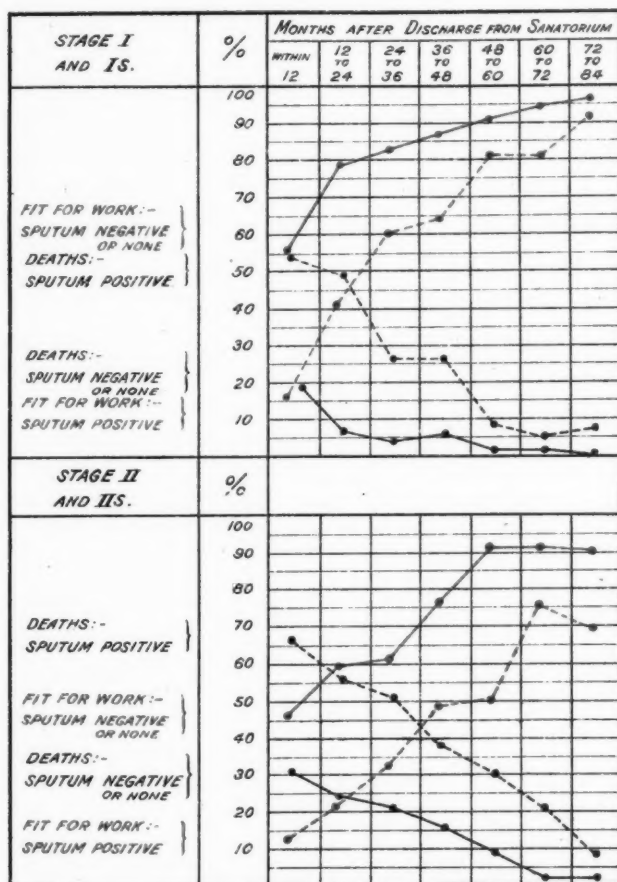
A large proportion of the cases complicated by mixed infection had undergone operations before reaching us; in such cases return of function could not, of course, be expected.

Heliotherapy is not only useful in healing, but also in preventing tuberculosis. Children should be brought up from earliest infancy in an environment which includes much sunlight and fresh air. If the human race is to master the tuberculosis problem, great changes will have to be made in the habits of man and in the construction of dwelling-houses. Every house should be provided with a balcony on its sunny side. This serves as a constant temptation to the inhabitants to exchange the confined indoor atmosphere for the fresh outdoor air and sunlight. While advisable for everyone, sunlight and fresh air become an absolute necessity for those who already present symptoms of tuberculosis, or in whom the hereditary tendency is high. For the use of the latter class we started some ten years ago an "École au Soleil" at Cergnat in the Alpes Vaudoises. The object of this school is to provide an anti-tuberculous environment for delicate or predisposed children. Sunbaths, exercises and games in bathing clothes occupy a prominent place in the school curriculum.¹

The maintenance of cure is at the same time one of the most

¹ A description of the École au Soleil will appear in *The Child* for February, 1922.

RESULTS OF SANATORIUM TREATMENT.



From the after-results of Sanatorium Treatment granted to 3,326 insured persons since July, 1912, the chart above has been prepared showing in percentages to the number surviving at stated periods after leaving Sanatorium, that the mortality decreases and the proportion fit for work increases as the period of survival becomes greater, and contrasting in this connection the more favourable results where the sputum is negative or absent as against positive.

important and difficult problems of tuberculosis, especially when the patients concerned come from working-class families. The love of sunlight and the dislike of a stuffy atmosphere naturally follow treatment by heliotherapy, and are in many cases sufficient to prevent recurrence of the disease. In other cases the return to city life must of necessity be fraught with danger, and a healthier occupation should, if possible, be chosen. For this type of case the farm and market garden settlement provides the necessary environment. We have recently started a colony of this kind in one of the southern cantons of Switzerland, and hope soon to enlarge the scope of the scheme considerably. At first we feared the heavy agricultural work might prove too heavy for recently recovered cases. We were, however, glad to find that the splendid muscular development which is the rule in heliotherapy made these fears groundless. After a few days on probation our discharged cases were able to do a full day's work without fatigue.

Farm settlements of this kind might well be followed by permanent village colonies. Were schemes of this kind to become generalized I believe we should soon be able, from the ex-tuberculous patients, to build up a race which would be more highly resistant to tuberculosis than any race on earth at the present time. To conquer tuberculosis we must change our habits of thought and our methods of life.

THE PREVENTION AND TREATMENT OF TUBERCULOSIS IN THE ADMINISTRATIVE COUNTY OF LANCASTER.

By G. LISSANT COX,

M.A., M.D. (CANTAB.),

Central Tuberculosis Officer to the Lancashire County Council.

THE population covered by the Tuberculosis Scheme of the Lancashire County Council numbers 1,746,418 (Census), and at the end of 1920 there were 9,007 known cases of tuberculosis under the supervision of the dispensary medical and nursing staffs, 7,225 of whom had formally applied to the Council for treatment.

The Dispensary Organization.

Under the scheme the county is divided into five large dispensary areas (average population 330,284) and two sub-areas, each under the charge of a consultant tuberculosis officer, having one or more assistant officers, and at his chief dispensary a laboratory, in some cases an

X-ray apparatus, and an office and clerical staff. There are in addition thirty tuberculosis health visitors working from twenty-two dispensaries. The extent of the work may be judged from the fact that during 1920 the tuberculosis officers examined 5,526 persons for diagnostic or consultative purposes and visited 4,300 patients at their homes; patients' attendances at the dispensaries numbered 27,912, and nurses' visits and revisits to patients' homes were 55,525.

At the dispensaries ordinary symptomatic treatment is not undertaken, and as a matter of fact never has been, provided the patient has a doctor and is receiving satisfactory treatment. The tuberculosis officer and his staff deal more particularly with the diagnosis of patients and with the special forms of treatment. One of the essential features of the scheme has always been the acknowledgment of the necessity for the closest co-operation between the tuberculosis medical staff and the general practitioners. Of the new cases examined in 1920, 70 per cent. were referred to the tuberculosis officer by practitioners, pensions authorities, and health officials for an opinion as to diagnosis or treatment *prior to particulars of notification being received*. Special attention is paid to the housing conditions of the infectious pulmonary patients, and at the end of the year the sleeping accommodation of 1,849 of such cases—showing improvement on previous years—stood as follows: Separate bedroom, 72.6 per cent.; separate bed, 16.1 per cent.; without separate bed, 11.3 per cent. The improvement is due in no small degree to the bedsteads and mattresses lent out by the County Council through the dispensaries to necessitous cases. Of 877 "contacts" examined, 61 proved to be tuberculous, 199 were "suspicious" and kept under observation, the remaining 617 being non-tuberculous. Very few fresh cases of consumption have arisen in households under the continued supervision of the dispensary staff.

Death-Rate and Notification.

The death-rate from pulmonary tuberculosis in 1920 fell to 0.76 per 1,000 of population, and proved to be the lowest ever recorded in the county. The abnormal rise, to so high as 1.07, during the war years can now be looked upon definitely as a direct effect of war conditions. Lancashire is mainly an industrial county, with a large proportion of the female population engaged in factories and workshops, and it is interesting to note that the sex death-rates from phthisis equalled 0.88 for males and 0.65 for females.

The subject of late notification and non-notification of cases under the "Public Health (Tuberculosis) Regulations, 1912," on which depends so much the successful working of tuberculosis schemes, has received special attention. Careful analysis of the returns of deaths has been made for several years, and the percentage of non-notified

fatal cases in the county is found to be declining appreciably, as will be seen: 1918, 18 per cent.; 1919, 16 per cent.; 1920, 13 per cent. In order to obtain some data as to the circumstances attending such omission to notify cases, the whole of the deaths (163) from tuberculosis occurring during a specified period were scrutinized and particulars ascertained by special inquiry from the practitioners concerned and from other sources. The investigation yielded the following important facts: (1) That so many as 58 of the 163 deaths occurred in public institutions; (2) that of the remaining 105 deaths the circumstances of non-notification were as set out below:

Circumstances of Non-Notification.	Pulmonary Cases.	Non-Pulmonary Cases	Total.
Doctor in attendance shortly before death (0 to 3 weeks) ...	5	19	24
Misinterpretation of Tuberculosis Regulations and notification believed unnecessary ...	13	3	33
Attended by more than one doctor and notification believed to have been made by first practitioner ...	9	8	
Complicated cases, presenting difficulty in diagnosis ...	6	19	25
Accidental omission to notify ...	5	7	20
No apparent reason for non-notification ...	4	4	
Information not ascertained (no reply received to inquiries) ...	3	—	3
Total ...	45	60	105

(3) that in almost one-third of the 105 deaths notification was not made owing to a misunderstanding of the Tuberculosis Regulations or to the belief that the case had already been notified.

In regard to (3) the cause of the misunderstanding appears to have been that part of Article V. of the Tuberculosis Regulations which directs that a practitioner "shall not notify a case . . . if he has reasonable grounds for believing the case has already been notified . . . to the Medical Officer of Health for the district within which the place of residence of the person is situate," and I am strongly of the opinion that the Regulations should be simplified by leaving out this unsatisfactory qualification as to notification. It would then become the

simple duty of a doctor to notify every new case of tuberculosis occurring in his practice. In 26 per cent. of the total fatalities (1,323) from pulmonary tuberculosis death took place within three months of the case notification.

Stage of Disease in New Cases.

Of the new insured patients applying for treatment in 1920, 19.9 per cent. were found to be in the third stage of the disease, and 33.4 per cent. only could be classified as early or first-stage cases. These figures are less favourable than in 1919 and 1918. The increase is solely amongst male patients, and seems to indicate that this is due to the cessation of the universal medical examination of adult males carried out during the war years, which was the means of detecting a larger number of early cases than is the case at present, when the initiative rests with the patient to consult his doctor if feeling unwell.

Care Committees.

There are nine voluntary care committees established in the county, covering an estimated population of 514,173. Excellent work has been accomplished by them during the year, some 428 patients being granted assistance in one way or another. The County Council have shown their appreciation of the valuable work done by the care committees by making them a grant under Section 2 of the Public Health (Tuberculosis) Act, 1921, based on the net amount expended by them in one year on the actual assistance of patients.

Advanced and Chronic Pulmonary Cases.

The best method of providing accommodation for patients who are acutely ill and require to be isolated on general public health grounds is to treat them in buildings attached to isolation hospitals, both on the grounds of economy and to enable such patients to be in small numbers in each institution and to be as near their homes as possible. As far as possible, the patients from each of the five dispensary areas requiring isolation are accommodated in the pulmonary hospitals situated in the area, and, in order that the consultant tuberculosis officers may keep themselves acquainted with the cases, arrangements have been made (with one or two exceptions, where only a few county cases are treated) for the tuberculosis officers to visit periodically the pulmonary hospitals in their area, and confer with the medical superintendents on the following matters: (1) The question of extension of patients' treatment or their return home, having special regard to the home conditions, which are known to the tuberculosis officer; (2) the question as to the patients' future treatment; (3) to deal with applications from patients for transfer to other institutions, or for their dis-

charge home, and to settle, where possible, any difficulties or complaints by patients which may arise. This procedure has enabled the highly infectious cases with unsatisfactory home conditions to remain at the pulmonary hospitals for long periods for the purpose of isolation, and for patients who have made good progress and are capable of light work to be transferred to sanatoria for the continuation of their treatment.

Short of complete isolation or segregation of infectious persons, tuberculosis will only be eradicated slowly. There is no short cut yet discovered for the conquest of this disease, but the diminishing death-rate should be, and is, an encouragement for all engaged in the campaign.

THE SERVICES OF THE SURGICAL TUBERCULOSIS OFFICER.

By C. LEE PATTISON,

M.B., B.S. (LOND.), M.R.C.S. (ENG.), L.R.C.P. (LOND.),

Surgical Tuberculosis Officer to the City of Sheffield; and Medical Superintendent of the King Edward VII. Hospital for Crippled Children, Sheffield.

FRANCE was the first country to realize the advantages which would follow the adoption of special means for the treatment of the so-called surgical forms of tuberculosis. State-supported hospitals, specially equipped and staffed, have been in existence there for the treatment of tuberculosis of the bones and joints for many years, and with excellent results.

In 1908 the first special hospital in Britain for "surgical" tuberculosis in children was started at Alton, in Hampshire, by Lord Mayor Treloar, with the medical service under the direction of Sir Henry Gauvain, to whom is due much of the elaboration of technique in the conservative methods of treatment which are now slowly being adopted in this country. During the past twelve years or so various hospitals and sanatoria have been founded for the treatment of children crippled by tuberculosis.¹

Sheffield Corporation was the first local authority to erect an institution for tuberculous child cripples. The King Edward VII. Memorial Hospital for children with osseous tuberculosis (130 beds) was opened in March, 1916.

¹ For reference to many of these see "Open-Air Schools and Children's Sanatoria," edited by Dr. T. N. Kelynaek, and published by Messrs. John Bale, Sons and Danielsson, Ltd., 1915.

It was soon found that some method of dealing with cases awaiting admission to the institution, and some arrangements for the care of discharged patients, which could be worked in close co-operation with the work of the hospital, were imperative, and for the following reasons: (1) The limited number of beds available (130), in conjunction with (2) the length of treatment required before cure could be confidently prophesied, made it impossible for all the cases which occurred in a city with a population of half a million to be dealt with adequately as in-patients.

Acting on the advice of the Ministry of Health, the Medical Superintendent of the King Edward VII. Hospital was therefore appointed Surgical Tuberculosis Officer for the city, and was directed to organize a scheme for dealing with all cases of surgical tuberculosis occurring in the municipal area. It may be of some interest, in the light of my experience during the last five years as Surgical Tuberculosis Officer to Sheffield, if I mention some of the points I consider valuable in "working" a surgical tuberculosis clinic.

The surgical tuberculosis officer should have full control of the work of his department, and should have general supervision of patients admitted to special hospitals or sanatoria in his district. In cases where special hospitals exist in his district solely for the treatment of surgical forms of tuberculosis in children or adults, it will probably be advisable for the surgical tuberculosis officer to be associated with the institution in an official capacity. Patients will attend the surgical tuberculosis clinic in the same way as they attend the tuberculosis dispensary.

In order to avoid the slightest interference with the work of the general practitioners, and thereby risking a certain amount of friction, which would destroy the value of the department, it is my practice in Sheffield to see only those cases which come to me with a "recommend" from their medical attendant, or from one of the general hospitals, or some responsible body such as the School Medical Department. This plan has worked well, and the co-operation and assistance of general practitioners and surgeons have proved a very welcome asset to the work. The medical tuberculosis officer and the school medical officer should also be in close touch with the surgical tuberculosis officer. It is an advantage if the surgical tuberculosis clinic can be held in the same building as the dispensary, so that the medical and surgical officers can consult together when desirable.

Patients who at the time of examination require immediate treatment are admitted to beds in special hospitals, or, if accommodation is not available, means are taken to relieve pain and to prevent formation of permanent deformity or development of undesirable complications. Some of these patients can be kept in bed at home with suitable

surgical appliances, the use of which is constantly supervised by specially trained surgical tuberculosis nurses. Others can be treated as out-patients in plaster-of-Paris or other splints, etc., and attend the clinic as often as necessary for examination. Convalescent patients, including patients discharged from special hospitals, are kept under supervision as often and for as long as may be necessary. They are examined to note progress of the cure, and for the onset of any symptoms requiring treatment. Surgical appliances can be examined from time to time, and altered and repaired when necessary. Patients with discharging sinuses are sold dressings when necessary, and are instructed as to the correct procedure in dealing with their wounds. Some of these attend the clinic daily to have their wounds dressed by one of the nurses; in other cases the nurse visits at the home.

The surgical tuberculosis officer will also be able to afford valuable advice as to the occupation suitable for patients of "working age," and should be able to get his patients suitable employment in many cases. Residential open-air technical colleges such as the one at Alton, where boys could be taught a trade suitable to their crippled capacities, are very valuable.

At the clinic the following rooms should be provided: (1) A waiting-room for patients. (2) Examination rooms. (3) Plaster room and theatre.

It is sometimes necessary to aspirate abscesses in patients for whom hospital accommodation is not available. Very little space and apparatus need be provided for this so long as the principles of aseptic surgery are rigidly observed.

With regard to the provision of surgical appliances, it is almost essential to have a skilled workman who will devote his time to this purpose, and who will be content and able to carry out the wishes of the surgeon. It is an advantage if he can make the splints, etc., at a workshop at the special hospital and attend the clinic when required. In many cases the surgeon can take plaster casts at the clinic and so provide the instrument-maker with a plaster model from which to work.

In order to have an efficient surgical tuberculosis department it is important to have the services of an adequate number of specially trained nurses. These need not necessarily devote their whole time to the work. In Sheffield we have found the use of a number of women health inspectors very satisfactory. All the inspectors so employed are fully trained nurses and have served a term of training (six months) in the special work at the King Edward VII. Hospital, so that they will understand the modern methods of treatment and diagnosis of the disease.

I have already indicated some of the ways in which the help of such nurses will be of service, but there are many other advantages to be

gained by their employment. They make visits to report on home conditions, and to see that the treatment is being properly carried out. They can keep patients in plaster under observation as often as necessary and thus remove the dangers which the employment of plaster of Paris in the treatment of out-patients undoubtedly affords. They can also dress wounds either at home or at the clinic, and in many other ways be of very material help to the surgeon.

DETOXICATED TUBERCLE BACILLUS VACCINE.

BY DAVID THOMSON,

O.B.E., M.B., CH.B. (EDIN.), D.P.H. (CAMB.),

Honorary Pathologist and Director of the Pickett-Thomson Research Laboratory,
St. Paul's Hospital, London, W.C. 2.

IN the *Lancet* of April 16 and April 23, 1921, the biochemistry of germs and the general process for obtaining the antigenic components of micro-organisms freed from the non-antigenic and poisonous constituents are described more or less in detail. Detoxicated tubercle bacillus vaccine prepared by this process has been on trial for over a year, and a considerable amount of evidence is now accumulating regarding its therapeutic value. In the first place it appears to be about 200 times less toxic than ordinary tuberculin such as B.E. It would seem, therefore, to be safer than the usual types of tuberculin, and, moreover, the therapeutic results obtained by many doctors who have tried it appear to be quite promising.

The Biochemistry of the Tubercle Bacillus.

In order to understand the composition of the numerous varieties of tuberculin now on the market, it is necessary to have a clear idea as to the biochemical composition of the tubercle bacillus. A considerable amount of work has been done in the past and in recent times on this subject, but the results have been in many instances rather indefinite, and at any rate the names applied to the various fractions obtained by various solvents and processes are very confusing indeed. Many of the tuberculins appear to have been prepared in a more or less empirical fashion without the authors being clear as to the nature of the germ constituents obtained by their respective processes.

According to my own researches, it is clear to me that the tubercle bacillus can be split up into the following different constituents :

(1) *An alkali-soluble protein substance* which may be correctly termed, I believe, metaprotein. It is probably a nucleoprotein. This substance is precipitated by acid, but when excess of acid is added it redissolves; when redissolved in excess of acid, however, it may be again precipitated by adding common salt (NaCl).

(2) *An acid-soluble protein substance* which I believe is also a species of metaprotein. This substance is precipitated by alkali and is not redissolved in excess of alkali.

(3) *A water-soluble substance* which is precipitated from its aqueous solution by half-saturation with ammonium sulphate and by 70 per cent. alcohol.

(4) *A water-soluble substance* which is precipitated from the aqueous solution by full saturation with ammonium sulphate and by absolute alcohol.

Fractions (3) and (4) correspond in their biochemical nature to primary proteose and deuteroproteose respectively, and I have been in the habit of calling them such in my publications so far. Albumose is apparently synonymous with proteose, so I might as well have called these fractions primary and secondary albumoses.

Professor Collingwood pointed out that I had not sufficient evidence to call fractions (3) and (4) proteoses or albumoses, since proteoses and albumoses are obtained from more compound proteins by digestion or hydrolysis, and he considered that the initial stage of my detoxication process—viz., dissolving in alkali—was hardly likely to cause sufficient hydrolysis to split up the more compound protein of the germ into hydrolytic products such as proteose.

Fraction (3), which I have been calling primary proteose, may therefore be a "*globulin*," since globulin is a protein which though insoluble in water is soluble in dilute salt solution, and is precipitated with half-saturation with ammonium sulphate. Fraction (4), on the other hand, may not be secondary proteose, but may be an "*albumin*," which the biochemists say is soluble in water and is only precipitated with full saturation with ammonium sulphate.

(5) The germ contains *other water-soluble fractions*, viz.—indicators and a brownish toxic substance. These are also soluble in absolute alcohol and are not precipitated by full saturation with ammonium sulphate.

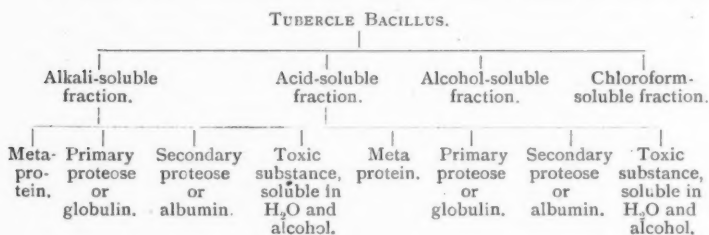
Fractions corresponding to (3), (4), and (5) are incorporated with fractions (1) and (2).

(6) There is an *alcohol-soluble lipoid fatty or waxy substance* which, unlike the toxic substances mentioned under (5), is insoluble in water.

(7) There is a *chloroform-soluble lipoid fatty or waxy substance* which is insoluble in alcohol and insoluble in water. My assistant, Mr. E. S. Dean, drew my attention to the interesting fact that of all these

fractions, No. (7) or the chloroform-soluble portion, is the only one which shows an acid-fast character when stained by the Ziehl-Neelsen method.

The above analysis may be expressed in tabular form as follows:



I do not claim that these represent the whole of the fractions into which the tubercle bacillus may be split. There will doubtless be many more fractions discovered in the future. Nevertheless, I feel satisfied that the fractions set out in the above table do exist, as I have isolated them again and again in the detoxication process. With regard to the immunizing value of these fractions, so far as I can ascertain all are antigenic except the toxic brown substance, which is soluble both in water and in absolute alcohol.

According to the latest books on protein chemistry—*e.g.*, Robertson (1918)—it is stated that proteins which are so simple in constitution that they are not precipitable by absolute alcohol are non-antigenic and incapable of producing anti-substances. This is strong support for my contention that the toxic fractions (5) are of no value in producing immunity. The proteoses or (globulin? and albumin?) have, according to the complement fixation test, some antigenic value. The metaprotein (both alkali soluble and acid soluble) is antigenic according to the complement fixation test. The alcohol-soluble lipid fraction was antigenic according to the complement fixation test in my hands. From these researches it would seem reasonable to include in the tubercle vaccine all of the fractions except fraction (5), which is toxic, harmful, and apparently valueless in producing immunity.

In a paper read at the Congress of the Royal Institute of Public Health in Brussels, May, 1920,¹ I stated that perhaps the proteoses might be found to be harmful, or at any rate that they might have a provocative focal action on the disease, since the gonococcus proteoses showed a provocative action in gonorrhoea. So far this point seems undecided, since some doctors have preferred the detoxicated tubercle vaccine containing the proteoses, whilst others thought that the variety which had the proteoses left out gave less reactions.

¹ See *Journal of State Medicine*, March, 1921.

Again, with regard to the alcohol and chloroform-soluble lipid fractions, certain observers in the past have considered that they are not only valueless as antigens but are harmful, toxic, and produce necrosis, etc. I am not inclined to believe such statements without further proof, since other germs contain alcohol-soluble fractions which are neither harmful nor toxic. For example, diphtheria vaccine (K.L.B.) detoxicated according to my method contains a large amount of alcohol-soluble lipid, and it has been found that this vaccine can be given in exceedingly large doses up to 350,000 millions without toxic effects and without producing any sign of necrosis at the site of injection. Until, therefore, it is more definitely proved that the alcohol and chloroform soluble parts of the tubercle bacillus are definitely valueless and harmful, I am inclined to include them in my vaccine. If it be granted that the tubercle bacillus is coated with the alcohol and chloroform soluble substance, then it ought to be desirable to get anti-substances formed against this outer coating if at all possible. For this reason I think the latter fractions should be included until we are able to prove definitely to the contrary that anti-substances cannot be formed against them.

Researches on the Biochemistry of the Tubercle Bacillus by other Observers.

There is a large amount of literature on this subject, but it is quite impossible to go fully into this matter in a short paper. The following extracts, however, are sufficient to show that many of these researches are somewhat indefinite and confusing to the reader.

Weyl (1891) extracted tubercle bacilli with warm caustic soda and obtained a solution which was precipitated by acetic acid. This precipitate he found to be an intensely toxic substance containing nitrogen, hydrogen, carbon, sulphur, and phosphorus, which he called *toxomucin*. Doses of 0.1 to 0.2 milligramme produced local necrosis in mice. Ruffel (1898) stated that this substance was not a mucin, but a nucleo-proteid. Tatasabuso Yabe prepared a similar product in the same manner, and obtained a tuberculo-mucoprotein which he believed to be the genuine *tuberculo-toxin*. Another substance was obtained which was called *tuberculo-bactericidin*. Aronson (1898) stated that toxic substances can be extracted from dried tubercle bacilli by boiling them with $\frac{N}{10}$ NaOH under pressure at 136° C. Ruffel (1898) precipitated the aqueous extracts of dry powdered tubercle bacilli (Koch's T.O.) with acetic acid, and then split up this deposit with 1 per cent. solution of sulphuric acid. In this manner he obtained his *tuberculosamin* and a nucleinic acid which he called *tuberculo-nucleinic acid*. According to Behring and Kitaschima (1899), tuberculinic acid is three and a half to four times more toxic than Koch's tuberculin. Sciolla

(1896) extracted a nerve poison from the tubercle bacillus with ether. Hammerschlag (1899) found substances in the alcohol-ether extracts of tubercle bacilli which caused convulsions when injected into rabbits. According to Anclair, the chloroform extract is said to contain the poison which produces fibrosis. Hoffmann (1894) reported the isolation of six proteins from the tubercle bacillus, but according to Vaughan (1913) there were mixtures. De Schweinitz (1897) thought that a nucleo-protein is the fever-producing agent in the tubercle bacillus. De Schweinitz and Dorset (1895-98) reported 6.95 per cent. of cellulose in the tubercle bacillus; Vaughan, on the other hand, found no cellulose. Levene (1898 and 1901) prepared three proteins from the tubercle bacillus; he also obtained a glycogen-like body. Kresslig (1901) extracted tubercle bacilli with ether, chloroform, benzol, and alcohol, and obtained 38.95 per cent. of fatty and waxy substance. Vaughan (1913) did much valuable work on the biochemistry of germs, including the tubercle bacillus, and isolated a toxic substance which was soluble in absolute alcohol and in water. Allen (1919) claims to have prepared a non-toxic tuberculin which he calls Tuberculin M., which consists of "albumose-free" tuberculin and tubercle bacilli lysed in alkali, and thereafter subjected to oxidation and hydrolysis with hydrogen peroxide. He gives no clear account of his process nor any concise idea as to its biochemistry. Nevertheless, he claims that his tuberculin is "far superior to any other tuberculin so far produced." Hans Much (1920) states that dilute acid splits up the tubercle bacillus into four distinct antigens: (1) water-soluble (partigen L), (2) protein (partigen A), (3) fatty acid-lipoid (partigen F), and (4) neutral fat-aliphatic alcohol (partigen N).

I think that the reader will agree with me that it is very difficult to extract concise and definite facts from masses of information of the above nature, and the numerous names which have been given by the different authors to their products are exceedingly confusing and convey little enlightenment to the ordinary reader.

The Biochemical Composition of some of the Best-Known Tuberculins.

If we turn once again to my own researches, and more especially to the table which shows the various fractions of the tubercle bacillus along with their respective solvents, it is evident that with this knowledge some conclusions can be drawn as to the composition of many tuberculins.

Let us consider (1) *Koch's Old Tuberculin*. This was prepared by growing the germ on glycerine alkaline broth. The entire broth with germs is then sterilized and concentrated by evaporation to one-tenth its volume. It is then filtered through a Berkefeld filter to free it from any

bacilli which have not disintegrated. My researches tell me that this filtrate will contain chiefly the water-soluble fractions of the bacillus—namely, the primary proteoses (or globulins?), the secondary proteoses (or albumins?), and the toxic substances. Since the medium was alkaline it will likely also contain some alkali metaprotein. It will not contain the acid-soluble fraction and it will not contain the alcohol or chloroform-soluble parts, as even though the bacilli were disintegrated the undissolved lipid particles would not pass through a Berkefeld filter.

(2) *Koch's New Tuberculin T.R.*—Here the bacilli are again grown in glycerine broth (faintly alkaline). The bacilli are filtered off and dried. They are then pulverized, water is added, and the mixture centrifuged. The sediment left is again dried, pulverized, and treated again with water and centrifuged, the supernatant fluid poured off and the process repeated until no sediment is thrown down except that composed of gross accidental particles. The opalescent fluids resulting from all the centrifugalizations except the first is preserved with 20 per cent. glycerine, and is known as T.R. Composition of the product will be as follows: It will contain much of the water-soluble constituents of the germs already mentioned under the Old Tuberculin, viz., the proteoses and the toxic substances. It will, however, contain also a considerable amount of all of the other fractions, viz., the alkali, acid, alcohol, and chloroform soluble fractions; these fractions are insoluble in water, but when in a finely divided pulverized state it is very difficult to drive the smallest particles down in the centrifuge. The lipid particles are very light and will not be driven down, but the smaller particles will rise to the top on centrifuging. I would expect T.R., therefore, to contain a certain amount of lipid substance. N.B.—A large amount of the lipid will be removed in the first supernatant fluid which is poured off and discarded, and which is known as Tuberculin Oberer.

(3) *Bacillen Emulsion (B.E.)*.—This was a still later form of tuberculin made by Koch (1901). Since B.E. is not washed but simply ground up it should contain all the extractives along with the entire contents of the bodies of the tubercle bacillus.

(4) *Beraneck's Tuberculin*.—The bacilli are filtered free from the bouillon medium and they are then shaken for a long time at 60° to 70° C. with 1 per cent. orthophosphoric acid. Equal parts of the untreated toxic filtrate and of the acid extract are combined to form the whole tuberculin.

This tuberculin will contain the water-soluble proteins, including the toxic parts, and should also be rich in the acid-soluble protein. It will also contain a certain amount of lipid, unless the two extracts were filtered through porcelain.

(5) *Von Ruck's Watery Extract*—The bouillon culture is evaporated

in vacuo to one-tenth its volume, then filtered through paper and porcelain. Precipitate with an acid solution of sodic bismuth iodide. Filter and neutralize the acid solution. Filter again. Precipitate with absolute alcohol to make 90 per cent. and filter, wash the precipitate with absolute alcohol. Dry the precipitate and make a 1 per cent. aqueous solution. The last filtrate is Von Ruck's tuberculin. This tuberculin will contain only the water-soluble parts of the bacillus, viz., the primary and secondary proteoses; the toxin is dissolved away with the washing in absolute alcohol. This tuberculin should be non-toxic, but may be provocative because it consists entirely of the proteoses.

(6) *Dixon Tubercle-Bacilli Extract*.—The dried bacilli are treated with ether to remove the lipid waxy material from them. The lipid free bacilli are then dried, ground in a mortar, suspended in physiological salt solution, and shaken for eight to ten hours. The suspension is now allowed to stand for several days at room temperature. It is finally passed through impervious bacteria filters several times, and the filtrate represents the final tuberculin. This form of tuberculin will contain the water-soluble proteoses of the germ, viz., the proteoses and the toxin. I do not think it can possibly contain much else because of the filtration, but that depends entirely on the nature of the filters used. A Berkefeld filter, for example, would not allow small particles of lipid to pass through, neither would it allow the passage of any of the water-insoluble protein particles, such as the alkali or acid-soluble metaprotein. In its composition, therefore, it should be akin to Von Ruck's watery extract except that it would contain the toxic substance as well. The author's experience with a Berkefeld filter shows that it tends to hold back the highly organized metaprotein of germs even when in alkaline solution. If an alkaline solution of the gonococcus is passed through a Berkefeld with the aid of suction, it is found that the metaprotein is held back and only the proteose substances are present in the filtrate.

The Biochemical Composition of the Bovine Tubercle Bacillus.

This organism can be split up into the same fractions as in the case of the human type of the germ. Nevertheless the biochemical analysis of the two types shows considerable differences. My brother, Dr. Robert Thomson, found that the bovine type was more easily dissolved in antiformin, and that it contained less lipid substance. Moreover, the precipitating points of the alkali-soluble fractions were quite different in the two types.

The Rôle played by the Secondary Organisms in Tuberculosis.

There is no doubt that tuberculosis in the lungs is always a mixed infection, wherein a whole host of pyogenic and catarrh organisms play

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a considerable part. In phthisis, therefore, vaccine treatment should not be confined to the administration of tuberculin alone. Much good can be done by combining the tuberculin treatment with the administration of a good mixed coryza vaccine, preferably autogenous.

Dr. Geraty has spoken very highly of the detoxicated mixed coryza vaccine as a most valuable remedy against those acute catarrhal affections which so hinder progress in many cases of tuberculosis of the chest.

Final Conclusions.

The production of a satisfactory tuberculin is largely a matter of accurate biochemistry. Thereafter a large series of careful laboratory tests must be carried out with the various biochemical fractions in order to ascertain the antigenic properties of each. Finally a series of careful clinical tests must also be carried out with regard to each separate fraction. When this is done the biochemical bacteriologist is in a position to compound a therapeutic and safe tuberculin, wherein the harmful and useless portions of the germ are discarded.

The preparation of various tuberculins hitherto has been in my opinion rather empirical and haphazard, and I sincerely hope that this paper may point the way to the preparation of more scientific, safer and more efficient products in the future.

The detoxicated tubercle bacillus vaccine described above is, I sincerely hope, a step in this direction.¹

¹ The author has recently made important improvements in his detoxication process, whereby the vaccine is rendered still less toxic and consequently safer to use.

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TABLE INDICATING THE BIOCHEMICAL COMPOSITION OF VARIOUS TUBERCULINS.

Unchanged Tubercle Bacilli.	Bacillary Emulsion, B.E.	Koch's Old Tuberculin.	Koch's New Tuberculin, T.R.	Beraneck's Tuberculin.	Von Ruck's Watery Extract.	Dixon's Tubercle Bacilli Extract.	Thomson's Detoxicated Tubercle Bacillus.	Thomson's Detoxicated T.B. minus Proteases.
<i>Alkali-soluble fraction:</i>								
(1) Metaprotein ...	+	Trace	+	Nil	Nil	Nil	+	+
(2) Primary proteose ...	+	+	+	+	+	+	+	Nil
(3) Secondary proteose	+	+	+	+	+	+	+	Nil
(4) Toxin ...	+	+	+	+	Nil	+	Nil	Nil
<i>Acid-soluble fraction:</i>								
(5) Metaprotein ...	+	Nil	+	+	Nil	Nil	+	+
(6) Primary proteose ...	+	+	+	+	+	+	+	Nil
(7) Secondary proteose	+	+	+	+	+	+	+	Nil
(8) Toxin ...	+	+	+	+	Nil	+	Nil	Nil
(9) Alcohol-soluble lipid ...	+	Nil	Trace	?	Nil	Nil	+	+
(10) Chloroform-soluble lipid ...	+	Nil	Trace	?	Nil	Nil	+	+
Total of ten fractions ...	All ten fractions.	Seven fractions present.	All fractions, (9) and (10) scarce.	Fraction (1) absent.	Only four fractions present.	Six fractions present.	Total of eight fractions.	Total of four fractions.

SWITZERLAND AS A PERMANENT RESIDENCE FOR THE TUBERCULOUS.

By BERNARD STRACEY,

CAPT., R.A.M.C., T. (RETIRED), M.B., CH.B. (EDIN.),

Late Medical Investigator to the Royal Commission on the Care and Control of the Feeble-Minded; formerly Pathologist to the Crichton Royal Institution, Dumfries, Scotland.

THE management of a tuberculous case is usually considered to be quite straightforward: a sanatorium or some form of hygienic treatment is prescribed, and more or less improvement usually results. But when a patient has undergone the course of sanatorium residence a more difficult problem arises: How is he to arrange for his future life? As an old patient I can speak of one form of after-care which may be helpful to my medical colleagues—namely, that of permanent residence in Switzerland. I have now lived in the Playground of Europe for a number of years, and at the request of the Editor I venture to indicate some of the advantages and disadvantages of Alpine residence. It must be understood that throughout this article I am speaking of places 2,500 feet or more above sea-level.

Climate.—In Switzerland the difference between summer and winter is much more marked than is the case in the British Isles. In my experience warm weather usually extends from mid-April to the end of September. The change from wintry conditions is rapid; the Föhn wind (S.W.) quickly melts the snow, and thaws the frozen ground. The air from being excessively dry becomes very damp, and fog is frequently formed at the lower levels. Summer itself appears so gradually that its advent is hardly noticed: an increased intensity of the sun's heat, more frequent thunderstorms, and the cutting of the first hay-crop, awaken one to the fact of its presence. During summer the heat of the sun, when experienced at a height of 3,000 or more feet, is very intense, but, thanks to the bracing air, walking is not found so fatiguing as during a hot summer's day in England. The change to autumn is also very gradual—cooler nights and possibly a little frost reminding one that winter is approaching. Cold weather comes suddenly, and when snow and hard frost set in they usually persist right on from November to March. For the last two winters there have been thaws and mild spells at times, but this is unusual. Two facts have impressed me in contrasting the Swiss and British climates:

(1) The sun's heat in Switzerland during autumn and winter appears considerable to a native of the British Isles: it feels to him to be like summer heat. What a difference this makes to anyone who has to spend much time resting in the open air! In England, with the exception of a few favoured places on the South Coast, the sun in winter has little power to warm, and a tuberculous patient when resting out of doors endures much misery.

(2) The other characteristic I have observed is, that changes of weather in Switzerland are much more definitely marked as contrasted with England. When it rains it rains hard and the sun comes out immediately the rain has stopped. There seems little of the "sulky weather" so prevalent in the British Isles. In my opinion this makes an enormous difference to a person of lowered vitality. The general impression he retains is one of warmth and sunshine, even although the yearly rainfall is greater than in England.

Recreations.—When an individual is cut off from his old surroundings and friends, he is thrown much more on his own resources, and unless he has means of occupying himself will soon cease to improve in health. As a general rule, tuberculous cases cannot take any violent exercise: climbing, walking, and winter sports are undoubtedly much easier at an elevation of some thousands of feet above sea-level than nearer sea-level, and this is nowhere better described than by the late J. Addington Symonds (himself a tuberculous case) in his delightful book "Our Life in the Swiss Highlands." None the less, the increased feeling of vigour has to be restricted or it will lead to disaster.

There are places in Switzerland, such as Grindelwald, Murren, and Château d'Ex, where British people are to be found all the year round, and anyone dependent on intercourse with his fellow-countrymen had better choose some such place for his permanent residence. These places, it must be remembered, have the disadvantage of attracting rather too many visitors in summer.

For anyone who can take an interest in the life of the Swiss natives, and who has sufficient resources in himself, a much wider field is opened up. There are many beautiful places in Switzerland where tourists do not congregate—places from which a town can be reached easily, and where a quiet life amongst the silence of the mountains, and amid fields bathed in sunshine, and with abundance of bracing air will restore the weakened vitality and prolong the shattered life.

Accommodation.—Hotel or pension life undoubtedly appeals to some people, but permanent residence in either seems hardly suitable for a tuberculous case. The difficulty of keeping rest hours, of getting suitable food and securing periods of quietness are obvious, and, although for a short time pension life offers novelties, most people, sooner or later, desire a house of their own. In frequented resorts in Switzerland a furnished chalet can frequently be obtained. Such houses are usually up-to-date and comfortable. Apartments can also be had in chalets where the ménage is looked after by the *propriétaire*. I have known people who have lived in such apartments for many years, and apparently in comfort. It is otherwise in districts unfrequented by tourists; small chalets are unobtainable; sanitation is unknown, and frequently no water can be had in the houses. Sometimes a portion of a chalet is let and separate entrances and kitchens are provided, and most of the large chalets in these districts contain two or more families;

but, again, the want of modern conveniences renders such accommodation unsuitable for my countrymen.

The only remaining course for those who love the unspoiled Switzerland, where hotels and tourists are unknown, is to build a house. This can be done more cheaply than in England. Wood, of which the chalet is composed, is fairly cheap, and workmen demand moderate wages, and do not restrict their working hours to eight. Transport of materials may, however, be a heavy item.

The Swiss chalet is in every respect ideal for a tuberculous case. Wide eaves and numerous balconies provide sheltered places for resting in all weathers. The solid wooden walls four or five inches thick render the house cool in summer and warm in winter. Absence of carpets and the smooth planed walls permit of keeping the rooms practically dust-free. Heating has usually to be arranged for by means of wood, and, as open fires are not suitable for this, one is forced to employ stoves. This form of heating I have found comfortable provided ventilators or windows are kept open. In some parts of Switzerland coal can be obtained at a price about double that paid in England, and when it can be secured at a reasonable rate open fire or central heating is possible. In many parts of Switzerland electricity is plentiful and cheap.

Cost of Living.—It seems to me that most things in Switzerland are, at present, more expensive than in England. With the exception of milk (about 5d. per litre = $1\frac{3}{4}$ pint) foodstuffs cost about the same. Clothing has always been, and still is, expensive; chocolate, tobacco, and wine are relatively cheap. All materials for furnishings are dear.

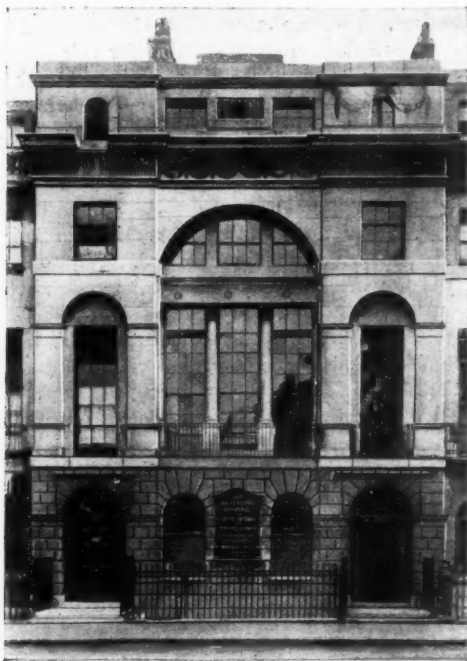
In hotels and pensions accommodation can be obtained at a lower rate than in the British Isles, and, comparing the same class of hotel, accommodation and service are certainly better. In Switzerland one can always depend upon good food and a comfortable bed even in the most unfrequented districts. On the whole, I believe anyone who desires to do so can live on a smaller income in Switzerland than in England, but he must be prepared to accept the meals and accommodation of the country.

Personal Equation.—This really is the crux of the whole question as to whether residence in Switzerland is or is not suitable for a tuberculous patient. Can the individual adapt himself to new conditions of living? Is he prepared to find interests in himself? Can he cut himself off, to a great extent, from friends and relatives? Will he learn the language of the country? These are the questions which have to be answered before any such drastic step as removal for a long time to a foreign country is contemplated. If these questions can be satisfactorily answered, there are few places where a pleasanter and healthier life can be led than in Switzerland, and if the somewhat sketchy information I have given can aid anyone in coming to a decision my object in writing this article will have been attained.

ASSOCIATIONS AND INSTITUTIONS.

MOUNT VERNON HOSPITAL FOR
TUBERCULOSIS.

THIS national institution for the care of tuberculous patients is still maintained by voluntary efforts. It was founded in 1860 at Hamp-



THE MOUNT VERNON HOSPITAL FOR TUBERCULOSIS: OFFICES AND OUT-PATIENTS' DEPARTMENT, 7, FITZROY SQUARE, LONDON, W. 1.

stead. In 1904 the Northwood branch was opened, and here since 1913, when the Hampstead centre became the headquarters of the Medical Research Council, the in-patient work has been concentrated. The out-patient department and the London offices are situated at 7, Fitzroy Square, Euston Road, W. 1. All forms of tuberculosis are

treated. Elaborate extensions have just been completed at Northwood whereby new recreation halls have been provided for men and women patients. Two large wards have also just been opened for children—



MOUNT VERNON HOSPITAL FOR TUBERCULOSIS, NORTHWOOD, MIDDLESEX: THE TERRACE.

one for boys under twelve, and the other for girls up to sixteen. Surgical forms of tuberculosis as well as cases of pulmonary tuberculosis are treated at Northwood.

NOTICES OF BOOKS.

TUBERCULOSIS OF CHILDREN: ITS DIAGNOSIS AND TREATMENT.¹

THERE are few subjects in medicine which claim the work of investigators so much as that of immunity in relation to tuberculosis, and Professor Much's views on that subject, which are expressed in the general part of this book, and which his translator describes as "startling," will claim much attention in the immediate future. The discovery of "partigens" and the method of treatment advocated by their use, if corroborated by other investigators, will certainly lead to far-reaching results in the treatment of tuberculosis. Much holds the view "that there exists an immunity against tuberculosis in the human being, which has its beginning usually spontaneously through a vanquished or a well-controlled infection in childhood." His estimation of immunity by partial antigens, and his view that cell immunity represents the main and lasting immunity, are highly interesting. In the light of the generally accepted view, that the post-mortem examination is the final judgment-seat of the presence or absence of tuberculosis, his statement is noteworthy—that a tuberculous infection cannot be established by the findings of pathological changes alone; and in support of his contention he quotes the work of Wolff, who found the granular form of tubercle bacilli in entirely normal glands of children exhibiting no visible anatomical or pathological tuberculous changes, and that the implantation of these glands produced active tuberculosis. In Part II. of the book there is a masterly review of the diagnosis of tuberculosis as it occurs in children, but many of his statements are too dogmatic and altogether at variance with the observations of other experienced clinicians. In the section dealing with treatment, he lays down the following fundamental axioms: (1) "That the disease must be energetically attacked in childhood." (2) "That all attempts and efforts to cure tuberculosis have consciously or subconsciously as their ultimate purpose the development of anti-bodies." The section on treatment deals specially with tuberculosis occurring in the bronchial glands and its management—(1) By specific treatment with partigens, so as to increase immunity directly. He holds that all forms of tuberculosis are adaptable to this treatment, unless there is complete absence of anti-bodies. (2) By X-ray treatment, so as to act directly on these glands and indirectly to increase immunity. The author also reviews the treatment of tuberculosis by sera, more especially the preparations of Spengler, Marmorek, and Maragliano, and states that they are of little use, in that "cellular immunity" is not influenced by a serum alone,

¹ "Tuberculosis of Children: Its Diagnosis and Treatment." By Professor Dr. Hans Much, Director of the Department for the Science of Immunity and for the Research of Tuberculosis at the University of Hamburg. Translated by Dr. Max Rothschild, Medical Director of the California Sanatorium for the Treatment of Tuberculosis, San Francisco and Belmont, California. Pp. vi + 156. New York: The Macmillan Company. 1921.

and that in the preparation of these sera one or other of the partial antigens is wanting. Although we would have liked proof of many of the dogmatic statements occurring in many pages of this notable book, a study of the monograph will prove highly interesting and instructive to all those engaged in the study of tuberculosis. The translator, Dr. Max Rothschild, is to be congratulated on the excellence of his translation.

D. BARTY KING, M.D.

DOMICILIARY TREATMENT OF PULMONARY TUBERCULOSIS.

The title of Dr. Walters's excellent handbook¹ is somewhat misleading. It suggests that the subject dealt with is the home or domiciliary treatment of tuberculosis, whereas it actually covers a much larger and more varied therapeutic field. The volume consists in all of twenty chapters, which are well and concisely written, and in which much excellent information regarding the treatment of pulmonary tuberculosis and its symptoms and complications will be found. The first chapter deals with the diagnosis of pulmonary tuberculosis, a subject which, in a book of this character, might well be left out. Six chapters are devoted to preventive treatment, and these contain much useful and reliable information on the measures to be adopted for the prevention of the disease in the home. Two important chapters are devoted to a description of rest treatment and the management of pyrexia. Dr. Walters rightly emphasizes the importance of rest in the treatment of fever in pulmonary tuberculosis. This indeed is the crux of the successful institutional treatment of this disease. In the excellent account of graduated exercises, the author states that "no walking should be attempted so long as the pulse-rate goes up to 90"; but the writer would go further and insist that a persistent pulse-rate of 90 is not only a contra-indication to walking exercise, but is an indication for absolute rest in bed. There is a serviceable chapter on food and dietetics, in which the caloric value of different foods is fully discussed. In the section dealing with specific remedies there is a very excellent account of treatment with tuberculin. The advice on the various forms of specific treatment is sound and reliable. Dr. Walters, like others who have had an extended experience of tuberculin treatment, believes in its value in suitable and selected cases. Owing to misuse and abuse, tuberculin has fallen on evil days, but it is still to be viewed as a remedy of definite if somewhat restricted value in the treatment of tuberculosis. To all who are responsible for or interested in the treatment of cases of pulmonary tuberculosis, Dr. Walters's handbook will prove of practical value as a book of reference, and particularly by reason of the detailed and reliable information it contains. It is well worth keeping up to date, but in future editions the writer would suggest that the title should be "The Treatment of Pulmonary Tuberculosis."

H. HYSLOP THOMSON, M.D.

¹ "Domiciliary Treatment of Pulmonary Tuberculosis." By F. Rufenacht Walters, M.D., B.S., M.R.C.P. (Lond.), F.R.C.S. (Eng.), joint Tuberculosis Officer for Surrey. Pp. xii+290. London: Messrs. Baillière, Tindall and Cox. 1921. Price 12s. 6d. net.

TUBERCULOSIS AND ORTHOPÆDICS.

The orthopædic surgeons of the Victorian period, with their love of the knife and a pathetic reliance on the heavy, cumbrous, expensive appliances of the so-called instrument maker, no doubt lived up to their lights, but fortunately for tuberculous and other cripples new schools of orthopædic surgeons have arrived, and by the skilful application of conservative, hygienic, artistic, and scientifically educated methods, governed by a wider knowledge of nature's methods of curing disease, assisted greatly by the employment of radiography, and aided by the development of various practical measures for the prevention and arrest of pathological processes and the correction and compensation of deformities, a fresh field of orthopædics is now opening out for the relief of suffering humanity. And among the best known of modern conservative orthopædic procedures are those associated with the name of Calot and his colleagues at Berck-sur-Mer. A detailed treatise on Calot's methods is now available for English students and practitioners, and should certainly be studied by all surgeons, tuberculosis officers, school medical officers, and general practitioners called to advise in regard to the care and treatment of tuberculous cripples.¹ The new English edition, based on the seventh French issue, has been revised throughout by M. Calot, and has been admirably printed in England. The publishers have certainly issued this notable volume of over a thousand pages and over a thousand figures in a worthy form: it is a model of high-class, artistic printing. M. Calot and his colleagues place great reliance on the technique of their appliances, and make extensive use of plaster and celluloid. The details of their general technique are set forth with precision and orderly minutiae. For the successful treatment of orthopædic affections and of external tuberculosis the following essentials are insisted on: Early diagnosis; immediate treatment; perseverance in treatment; the preparation of well-fitting plasters in the reduction of tuberculous deformities; reduction of traumatism to a minimum; avoidance of operations on tuberculous affections; and "never open cold abscesses, but puncture and inject them." The advantage of Calot's work is that it provides the practitioner with an explicit guide and detailed directory, with one or more illustrations on almost every page. The first portion of the part descriptive of special technique is devoted to a full account of the ways in which tuberculous lesions calling for orthopædic and other procedures are to be dealt with. The essentials of principles and methods employed at Berck are set forth at length in the text and admirably illustrated. In the following words Calot summarizes the indispensables in the effective management of tuberculous lesions: "Prolonged rest, life in the open air, rational overfeeding, modifying injections, well-made apparatus." And to these must be added the all-important advice: "No surgical interference, no violent straightening." Calot urges with much emphasis his "great commandment" and "fundamental dogma," which is "never to

¹ "Indispensable Orthopædics: A Handbook of Treatment." By F. Calot, Chief Surgeon to the Hôpital Rothschild, Hôpital Cazin, Hôpital du Département de l'Oise, Institut Orthopédique De Berck, etc. Second English Edition, translated from the Seventh French Edition by A. H. Robinson, M.D., M.R.C.S. Royal 8vo. Pp. xii+1108, with 1,155 original figures and 8 coloured plates. London: Baillière, Tindall and Cox. 1921. Price 42s. net.

open tuberculous foci." It cannot be denied that many British surgeons continue to act in accordance with the teaching still prevalent in certain schools—namely, to remove the local tuberculosis lesion at as early a period as possible—quite overlooking the fact that tuberculosis must always be viewed and dealt with as a general disease. It is certainly very desirable that Calot's teaching and results should be appreciated in this country. Those who have made themselves acquainted with Rollier's views and watched his work at Leysin may be inclined to think that Calot errs in depending too much on plaster appliances, and some may well differ from him as to his use of modifying liquids for injection and his procedures in the aspiration of cold tuberculous abscesses. Perhaps the nearest approach to the most perfect means yet revealed for dealing with the various lesions met with in so-called surgical tuberculosis will be found by a judicious combination of the methods of Calot and Rollier. Be that as it may there is no doubt the English version of Calot's monumental work should be studied by every medical practitioner, and for those who are dealing with tuberculous cases it certainly is indispensable.

THE TUBERCULOSIS PATIENT.

In the carrying out of methods and measures aiming at the arrest of tuberculosis in a human subject there must be perfect co-operation between the patient and the medical adviser: loyalty, sympathy, understanding should be displayed on both sides. The doctor requires psychological insight as well as pathological knowledge, and the patient needs courage, and should possess fighting powers and put the utmost confidence in doctor and nurse and the restorative powers of Nature. Dr. Pottenger, who has had long experience of tuberculosis and tuberculous patients, and has written many important works on tuberculosis, has recently issued a most helpful manual for the tuberculous patient.¹ The author speaks of his work as consisting of "talks" which have taken place between himself and his patients; and certainly the chapters are models of concise, clear, practical exposition. Dr. Pottenger is careful to indicate that his book cannot in any way replace the physician, but doctors and patients should be quick to realize that such a manual as this can be of immense service in the fight in which both are co-operating. Much ground is covered, but essentials are placed in proper perspective. The nature, causation, manifestations, modifications, management, prevention, and arrest of tuberculosis are all discussed with much lucidity and real helpfulness. Medical superintendents of sanatoria and tuberculosis officers generally in this country are attempting too little in educational work, and we earnestly commend Dr. Pottenger's able work to them, and to all others working for the benefit of tuberculous patients and striving for the prevention and arrest of tuberculosis. The book is a model of popular, scientific, serviceable instruction in all the essentials relating to the White Plague.

¹ "Tuberculosis and How to Combat It: A Book for the Patient." By Francis M. Pottenger, A.M., M.D., LL.D., F.A.C.P., of Monrovia, California. Pp. 273. London: Henry Kimpton, 263, High Holborn, W.C. 1921. Price 10s. 6d. net. St. Louis: C. V. Mosby Company. 1921. Price \$2.00.

EPIDEMIC RESPIRATORY DISEASE.

A collective study of pneumonia and other infective diseases involving the respiratory tract has recently been issued by American medical experts, and deserves the careful study of all advisers called to deal with acute chest cases of an inflammatory nature.¹ This volume is a record of investigations carried out in American war camps by members of a special commission, and furnishes an excellent example of the advantages of scientifically directed team-work. A considerable part of the book is devoted to a consideration of the etiology and clinical features of influenza, and the pathology of the associated pulmonary disorders, especially pneumonia and purulent bronchitis. Serious students of influenza and the respiratory affections met with in connection with such epidemic outbreaks will appreciate the numerous references to works on the subject. There is a valuable section on secondary infection in the ward treatment of measles, with much suggestive information regarding carriers of hæmolytic streptococci and their relation to the occurrence of complications of acute respiratory diseases. Another chapter is devoted to the discussion of the pathology and bacteriology of pneumonia following measles. The volume closes with an excellent summary of the investigations and the conclusions reached, many of which seem to be of much practical importance. An appendix contains an account of the experimental inoculation of monkeys with *Bacillus influenzae* and the micro-organisms isolated from cases of pneumonia associated with influenza. The excellent illustrations add much to the permanent valuable of this notable volume.

DAIRY BACTERIOLOGY.

Many a sanatorium for tuberculous patients has connected with it a dairy, and whether this be so or not it is well that medical superintendents of sanatoria, medical officers of health, tuberculosis officers, and all others responsible for the safeguarding of health should possess at least a theoretical acquaintance with the essentials of dairy work. This can now be obtained in a convenient and reliable form by a study of the English version of Professor Orla-Jensen's standard work on "Dairy Bacteriology."² The volume opens with an Introduction on micro-organisms and fermentations. Then follow special chapters on the cleansing and procurement of milk, its normal and abnormal

¹ "Epidemic Respiratory Disease: The Pneumonias and other Infections of the Respiratory Tract accompanying Influenza and Measles." By Eugene L. Opie, M.D., Colonel M.R.C., U.S. Army, Professor of Pathology, Washington University School of Medicine; Francis G. Blake, M.D., Major M.R.C., U.S. Army, Associate Member of the Rockefeller Institute for Medical Research; James C. Small, M.D., formerly First Lieutenant M.C., U.S. Army, Bacteriologist, Philadelphia General Hospital; Thomas M. Rivers, M.D., formerly First Lieutenant M.C., U.S. Army, Associate in Bacteriology, Johns Hopkins University. Pp. 402, with 5 charts and 33 figures. London: Henry Kimpton, 263, High Holborn, W.C. 1. 1921. Price 36s. net.

² "Dairy Bacteriology." By Orla-Jensen, Dr. Phil., Professor of Technical Biochemistry in the Polytechnic College, Copenhagen, and formerly Director of the Swiss Experimental Dairy Station. Translated from the Second Danish Edition, with Additions and Revisions, by P. S. Arup, B.Sc. (Lond.), F.I.C., Chief Chemist to English Margarine Works (1919), Limited. Pp. xii + 180, with 70 illustrations. London: J. and A. Churchill, 7, Great Marlborough Street, W. 1. 1921. Price 18s. net.

microflora, the preservation of milk and its treatment for direct consumption, the applications of the lactic acid fermentation in the dairy industry, the normal and abnormal microflora of butter, the ripening processes of the different cheeses, the defects of cheese and the grading of milk. The work is thoroughly practical and should be studied by all interested in the improvement of the milk-supply in this country. The author's concluding words summarize his aim and indicate what should be our endeavour: "Healthy and clean cows, good milk, healthy children." The section dealing with tuberculosis is of exceptional interest, and we venture to reproduce the following: "Owing to the prevalence of bovine tuberculosis in general (in Denmark 30 to 50 per cent. of the cows are affected in one form or another) it is no wonder that tuberculosis of the udder is often met with. Generally speaking large herds seem to be affected the most. As udder tuberculosis makes rapid progress, the cows from which nursery milk is obtained should be examined by a veterinary surgeon at least once a fortnight. Owing to the dangerous nature of the disease, the Danish law orders the slaughtering of cows with tuberculous udders. Tuberculosis of the udder is, however, not the only form of the disease which may involve the infection of the milk with tubercle bacteria. This may also very well happen in cases of tuberculosis of the uterus and kidney or the intestine, and even tuberculosis of the lungs may be dangerous in this respect as the animals swallow most of the slime which they bring up, with the result that the bacteria pass into the manure. *Every form of open tuberculosis* must therefore be regarded as a source of danger as far as the milk is concerned. As tubercle bacteria do not grow at temperatures much below blood-heat, they will not multiply in milk or milk products under normal conditions, but as they are not killed by small amounts of lactic acid they can live in butter-milk. In the separating of milk the majority of the tubercle bacteria are removed with the separator slime, though appreciable numbers pass into the cream, while only very few remain in the separated milk. Raw milk is on this account less dangerous than raw cream or butter. Tubercle bacteria can live in butter for a much longer period than it is usually kept nowadays. In cheese-making the great majority of the bacteria as well as fat globules are precipitated with the curd, for which reason milk, and especially fresh cheese, may be far more dangerous than whey. According to Harrison the hard cheeses may contain virulent tubercle bacteria even after keeping for two months. The latest researches have established that the organisms of human and bovine tuberculosis are different varieties, the latter being less dangerous to adults than was formerly supposed, though dangerous to children. Tuberculosis is usually contracted by adults through inhaling the dried saliva of consumptive persons. On the other hand, bovine tuberculosis is very dangerous to calves and pigs, for which reason a law was passed in Denmark at the suggestion of Professor B. Bang, ordering all dairies to heat separated milk and butter-milk to 80° C. before returning it to the farmers, who use it chiefly for feeding pigs. It is regarded as a matter of the greatest importance that pathogenic germs are excluded from Danish butter in a similar manner." Professor Orla-Jensen's textbook is based on twenty-five years of research work, and merits the study of all interested in dairy practice.

MANUALS FOR MEDICAL ADVISERS AND
WORKS OF REFERENCE.

A notice of the second edition of the justly popular textbook of General Pathology, prepared by Professor J. M. Beattie and Dr. W. E. Carnegie Dickson, appeared in a recent issue of this journal.¹ We are now glad to welcome the second edition of the companion volume dealing with Special Pathology.² The complete work provides the medical student and practitioner of to-day with an up-to-date, concise, yet comprehensive guide to the fundamentals of human pathology. It is admirably suited to service as a guide in preparation for examinations and as a scientific exposition of the sure foundation of medicine. The work has been based on the teaching of the Edinburgh school, and is dedicated to the memory of the late Professor W. S. Greenfield, who for thirty-one years was Professor of Pathology in the University of Edinburgh. The latest volume, like its predecessor, is admirably got up, and is effectively illustrated. Following the generally approved method, descriptions are given of the various morbid conditions met with in the human body, arranged according to systems. In the next edition it would be well to provide a section dealing with skin lesions, and descriptions should also be given of the chief morbid conditions met with in the female genital organs. Tuberculous lesions are excellently described, and in many instances illustrated; the index gives reference to no less than thirty-nine separate sections dealing with tuberculosis. The description of tuberculous disease of the lungs and pleura is admirably expressed and helpfully portrayed by a number of reproductions of actual photographs. The section on tuberculosis of the lymphatic glands is also excellent. The volume is conveniently arranged, and by a judicious use of different types the presentation is such as will prove most serviceable to the student.

Professor Charles Phillips Emerson has just issued a new and fifth edition, rewritten and reset, of his well-known and justly valued monumental work on Clinical Diagnosis.³ It is dedicated to the memory of Sir William Osler. The first edition appeared in 1906, and the volume has found much favour among English-speaking clinicians and laboratory workers. The present issue is practically a new work. The author indicates in his Preface that his aim has been not merely to provide a manual for those whose outlook is restricted by the walls of the laboratory, but to provide a guide for students and practitioners of internal medicine, "whose conscience urges them to do their own laboratory work, or at least personally to supervise and to interpret all the laboratory examinations made for each of their cases." We fully

¹ See *British Journal of Tuberculosis*, vol. xv., No. 3, July, 1921, p. 126.

² "A Textbook of Special Pathology for the Use of Students and Practitioners." By J. Martin Beattie, M.A., M.D., M.R.C.S., L.R.C.P., Professor of Bacteriology, University of Liverpool, etc., and W. E. Carnegie Dickson, M.D., B.Sc., F.R.C.P.E., Director of the Pathological Department, Royal Hospital for Chest Diseases, London. Vol. II. Second Edition. Pp. xviii + 497-1084, with 267 illustrations in the text and 4 coloured plates from original preparations. London: William Heinemann (Medical Books), Ltd., 20, Bedford Street, W.C. 2, 1921. Price 31s. 6d. net.

³ "Clinical Diagnosis: A Textbook of Clinical Microscopy and Clinical Chemistry for Medical Students, Laboratory Workers, and Practitioners of Medicine." By Charles Phillips Emerson, A.B., M.D. Fifth Edition. Pp. xxx + 726, with 156 illustrations. Philadelphia: East Washington Square; London: 16 John Street, Adelphi, W.C. 1., J. B. Lippincott Company. 1921.

agree with Professor Emerson that "the present separation of laboratory and ward is an evil which cannot be too strongly condemned." This is specially true in regard to tuberculosis work. "The one who takes the history of the patient and makes the physical examination is the only one who can interpret correctly a laboratory finding. . . . The rather widespread and blind confidence which the past generation has placed in unpersonal laboratory reports has brought internal medicine into a certain degree of disrepute." We particularly commend to all tuberculosis officers and other medical specialists an unprejudiced consideration of these words: "Medicine is an art; it cannot be a science. While it is not a science, it has found all the sciences very useful in its development as an art. The medical student should understand that the sum total of all laboratory activities is not, and never can be, internal medicine, and that he as artist must try to see in each specimen something of the patient himself, and interpret it in terms, not of chemistry, physics, or biology, but of the suffering person." Professor Emerson's volume is a thoroughly practical one; just the sort to be kept in a sanatorium laboratory for frequent reference. The work opens with an excellent and very full chapter on "The Sputum," with a particularly lucid and serviceable section on the investigation of the expectoration in pulmonary tuberculosis. The following chapters afford detailed directions for the examination of the urine, stomach, and intestinal contents and faeces, the blood, the cerebro-spinal fluid, and the examination of other pathological products. The volume is a handsome one, beautifully illustrated, excellently printed, and furnished with serviceable references and a most helpful index.

Professor Oertel has written a handbook which will provide medical students with a highly interesting and helpful introduction to the scientific study of medicine.¹ It is a book which every busy practitioner can peruse with advantage. The author's aim has been to provide within reasonable compass a concise, comprehensive, connected, and readable account of the fundamental facts and essential considerations upon which modern pathology has been built up. He shows that "in the study of disease, no less than in the study of health, scientific vision is possible only if we divest ourselves of all metaphysical and teleological conceptions of use, harm, defence, vital forces, conscious purpose, etc., and treat pathological processes entirely as expressions of physico-chemical laws." Professor Oertel would appear to adopt a mechanical and materialistic attitude to disease which many would consider lacking in vision and recognition of the influence of psychological factors. He realizes the importance of an appreciation of the historic development of pathology, and is undoubtedly right in his endeavours to secure for the student the visualization of pathological occurrences. It seems a pity that there are no illustrations. The work is based on the pathology course followed at McGill University. The volume is divided into two parts: the first deals with etiological factors, the second with pathological processes—morbidity anatomy and histology and pathogenesis. The first twenty-two chap-

¹ "General Pathology: An Introduction to the Study of Medicine, being a Discussion of the Development and Nature of Processes of Disease." By Horst Oertel, Strathcona Professor of Pathology and Director of the Pathological Museum and Laboratories of McGill University and of the Royal Victoria Hospital, Montreal, Canada. Pp. xxi + 357. New York City: Paul B. Hoeber, 67-69, East Fifty-Ninth Street. 1921. Price \$5.00 net.

ters are devoted to a consideration of bacterial infection, pathogenic protozoa, and immunity. A special chapter is devoted to a description of the *Bacillus tuberculosis*, its morphology, staining properties, pathogenic effects, paths of infection, types, etc. The whole volume merits careful study. The busy practitioner will find it a particularly suggestive and illuminating one, and such as will enable him to bring his knowledge of the essentials of pathology well up to date.

Medical advisers of all sorts will be glad to welcome the new and eighth edition, revised and enlarged, of the popular "Index of Treatment," edited by Dr. Robert Hutchison and Mr. James Sherren.¹ This monumental, handsome, well-arranged, up-to-date, practical volume should be within the reach of every class of medical practitioner. Medical superintendents of sanatoria, tuberculosis officers, and other specialists will also find such a comprehensive reference work invaluable. There are no less than a hundred contributors. Dr. Hutchison provides an Introduction on "Some General Principles of Therapeutics." The subject-matter is conveniently grouped under headings alphabetically arranged. The volume contains over a thousand pages, and there are eighty-eight illustrations. Sir Robert Philip furnishes a particularly illuminating and helpful section on pulmonary tuberculosis; Mr. W. H. Clayton-Greene describes the management of tuberculous glands; Dr. H. Lambert Lack deals with tuberculosis of the larynx; Dr. Norman Walker has accepted responsibility for the section on lupus; Sir J. W. Thomson Walker explains procedures for treating tuberculous epididymitis; Mr. V. Warren Low describes measures for treating tuberculosis of bones; and Dr. Robert Hutchison has a short section on tuberculous peritonitis. The work, both in its design and execution, is excellent. There is a splendid index. The fact that since the first issue of the work in 1907 it has undergone a number of reprintings and is now in its eighth edition should be sufficient to indicate to every doctor that it is a volume to be possessed and frequently consulted.

Dr. R. W. Webster's fine textbook on diagnostic methods is another comprehensive work which deserves to be known and used by students and practitioners of medicine in this country as well as in America.² The first edition was issued in 1909, and the work is now in its sixth edition. In the Preface to the first edition the author insisted that "it is to be especially emphasized that laboratory work must go hand in hand with the more direct clinical examination of the patient, as the former can be interpreted only in the light of the latter." Dr. Webster's volume is one which it would be well for every tuberculosis

¹ "An Index of Treatment, by Various Writers." Edited by Robert Hutchison, M.D., F.R.C.P., Physician to the London Hospital and Physician to the Hospital for Sick Children, Great Ormond Street; and James Sherren, C.B.E., F.R.C.S., Surgeon to the London Hospital and Consulting Surgeon to the Poplar Hospital for Accidents. Eighth Edition, revised and enlarged. Pp. xviii + 1021, with 88 figs. Bristol: John Wright and Sons, Ltd. 1921. Price 42s. net.

² "Diagnostic Methods: Chemical, Bacteriological, and Microscopical. A Text-book for Students and Practitioners." By Ralph W. Webster, M.D., Ph.D., Assistant-Professor of Pharmacological Therapeutics and Instructor in Medicine in Rush Medical College, University of Chicago; Director of Chicago Laboratory Clinical and Analytical. Sixth Edition, revised and enlarged. Pp. xxxix + 844, with 37 coloured plates and 170 other illustrations. Philadelphia: P. Blakiston's Son and Co., 1012, Walnut Street. 1920.

officer to read through at least once every year. This so-called expert in one infection is in real danger of being seriously inefficient by too great restriction to his speciality. Dr. Webster's work provides him with a wide outlook, at least in literary form. It has been thoroughly revised and judiciously brought up to date. Descriptions of many new methods appear. The subject-matter is effectively presented under the following heads: The Sputum; Oro, Nasal, Aural, and Conjunctival Secretions; Gastric Contents; the Fæces; Parasites; the Urine; Secretion of the Genital Organs; the Blood; Transudates and Exudates; Secretion of the Mammary Glands; and Clinical Bacteriology. In the section dealing with the value of sputum examination for tubercle bacilli Brown's conclusions are referred to, and his modification of Gaffky's table for use in judging of the progress of a case is presented. Dr. Webster's volume is one of which author and publishers may well be proud. Its substance is thoroughly practical, and the numerous references make it indispensable for serious clinical investigators. The printing, illustrations, binding, and general get-up are all of the best.

Already many are planning for summer camping and a life in the open. Let all such and every lover of Nature and the free and joyous life of the wilds read Mr. Emerson Hough's latest book.¹ This collection of fascinating essays on camping and the camper's outlook and outfit is written primarily for Americans. It contains personal experiences, practical directions, serviceable suggestions, helps and hints which will also be appreciated by many in this country. The work is a handbook for fisherman and hunter as well as camper. The author is a lifelong sportsman and wanderer, and is an expert in all relating to tents, shoes, canvas, guns, and the science and art of tramping and camping and everything pertaining thereto. And besides the practical wisdom there is much literary charm. Certainly tuberculous patients will enjoy "Out of Doors."

Medical advisers having to visit New Zealand or afford information and guidance to health-seekers travelling thereto will find much that will interest and help in Dr. A. S. Herbert's authoritative and beautifully illustrated work on the hot springs of New Zealand.² The volume has been primarily prepared to provide the medical profession with reliable and detailed particulars regarding the value of the mineral water of New Zealand. The author was formerly in charge at Rotorua, and writes from special and intimate knowledge. He is convinced of the merits of the New Zealand spas, and certainly presents their claims in an informing and appealing way. The work is a valuable addition to the literature of British balneology. It is admirably got up, effectively arranged, and there are excellent maps and numerous attractive illustrations.

Clinical and other bacteriologists may be directed to the excellent practical manual on general micro-biology issued by the staff of the

¹ "Out of Doors." By Emerson Hough. Pp. ix+301, with 8 plates. London and New York: D. Appleton and Company. 1921. Price 7s. 6d. net.

² "The Hot Springs of New Zealand." By Arthur Stanley Herbert, O.B.E., M.D., B.S. (Lond.), Consulting Balneologist to, and late Government Balneologist to, the Dominion of New Zealand. Pp. xiv+284, with 3 maps and 87 illustrations. London: H. K. Lewis and Co., Ltd., 136, Gower Street, and 28, Gower Place, W.C. 1. 1921. Price 15s. net.

Michigan Agricultural College.¹ A new edition has just appeared, and provides a remarkably practical and reliable guide to all matters connected with laboratory instruction in bacteriology. The work is divided into three parts. Part I. presents a detailed description of general morphological and cultural methods such as will afford a working knowledge of laboratory methods used in the study of micro-organisms. Part II. consists of exercises demonstrating the various physiological activities of micro-organisms. Part III. deals with applied micro-biology. There is an excellent appendix, containing much information which will be invaluable to practical workers. The illustrations are numerous and well selected. A useful list of textbooks and reference works is given. The volume should have a place in every bacteriological laboratory.

Dr. D. Barty King has published an interesting monograph on influenza and its pulmonary complications, which every tuberculosis officer and all medical superintendents of sanatoria and other like institutions will find of much practical interest.² The volume consists of three studies in influenza carried out at the County of London (Horton) War Hospital at Epsom during the recent Great War. The first furnishes a detailed account of an outbreak of influenza among 150 malarial soldiers; the second furnishes a careful account of the after-effects of the acute pulmonary complications of influenza as revealed by clinical, radioscopic, and post-mortem examinations; the third describes the influenza epidemic (1918-1919) as it affected the nursing staff of the County of London (Horton) War Hospital. This collection of scientifically conducted clinical studies not only throws valuable light on some of the most serious pulmonary complications of influenza, but indicates the importance of a systematic investigation of the lungs by all available means in every convalescent from acute pneumonia or other disease in which lung involvement is wont to occur and often-times to persist in some ill-defined and not easily recognized pathological form.

Dr. F. Parkes Weber has published the first Michell Lecture on Tuberculosis delivered on November 1, 1921, before the Royal College of Physicians of London, in convenient brochure form.³ It is a particularly interesting and suggestive contribution to the study of tuberculosis, and merits the consideration of all engaged in tuberculosis work.

¹ "Laboratory Manual in General Micro-biology." Prepared by the Laboratory of Bacteriology and Hygiene of the Michigan Agricultural College. Second Edition. Pp. xxii+472. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd., 11, Henrietta Street, Covent Garden, W.C. 2. 1921. Price 21s. net.

² "Studies in Influenza and its Pulmonary Complications." By D. Barty King, O.B.E., M.A., M.R.C.P., Physician to the Royal Chest Hospital, London, etc. Pp. vii+88, with figures, tables, and case records. London: J. and A. Churchill, 7, Great Marlborough Street. 1921. Price 7s. 6d. net.

³ "The Relations of Tuberculosis to General Bodily Conditions and to other Diseases," with "An Appendix on Literature relating to the Subject of so-called Spontaneous Idiopathic Pneumothorax, etc." By F. Parkes Weber, M.A., M.D., F.R.C.P. Pp. 27. London: H. K. Lewis and Co., Ltd., 28, Gower Place, W.C. 1. 1921. Price 2s. 6d. net.

PREPARATIONS AND APPLIANCES.

A NOVEL GAS HEATER.

THE accompanying figure indicates the chief features of the new LAWSON ODOURLESS GAS HEATER.¹ This simple, effective, and inexpensive appliance for heating should be of service not only in private houses, but for use in hospitals, nursing-homes, sanatoria, open-air schools, and the like. The report of tests conducted by the National Physical Laboratory at Teddington indicates that the products of combustion found in a room in which the heater is used will depend on the size of the room, the character of the coal gas used, and the extent of ventilation provided. The heater contains burners in a cast-iron cone and combustion chamber, which speedily becomes red-hot and radiates much heat. There is an outer protective jacket of sheet steel. It is claimed that the heater is odourless.



THE LAWSON GAS HEATER.

It certainly radiates warmth from both sides, as well as from the top, where if desired water or milk can be heated. The appliance is compact, durable, portable, of attractive design, and it is estimated that with 14 to 20 cubic feet of gas per hour it will comfortably warm a room 16 feet by 16 feet, and with gas at 5s. a thousand feet costs less than 1d. an hour.

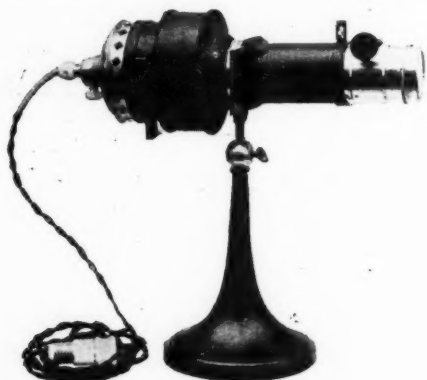
THE ELECTRICAL PROJECTOR.

Mr. W. H. Pettifor has a simple, portable, and very useful ELECTRICAL PROJECTOR,² which in medical training, scientific demonstrations, and other forms of educational work will be found of much service. The accompanying illustration indicates the general form and chief points in this ingenious contrivance. The light is supplied

¹ The Lawson Odourless Gas Heater is made in England, and is supplied by the Lawson Manufacturing Company, Limited, 323, Caledonian Road, N. 1, at the following prices: Black-lead or dull nickel finish, 48s.; polished nickel, 54s.; enamel finish, 63s.

² Particulars regarding the Projector can be obtained on application to Mr. W. H. Pettifor, 11, Victoria Street, S.W. 1. The price is £10 10s. complete.

by means of a gas-filled lamp, this giving efficiency combined with simplicity. We believe that in many sanatoria, dispensaries, open-air



THE ELECTRICAL PROJECTOR.

schools, as well as for instruction of medical students and nurses, and enlightenment of patients, this projector will meet a real need.

THE "REFEREADER."

Under the designation of THE REFEREADER there has been introduced an ingenious form of portable, folding book-rest, which can be used either when reclining in bed or when sitting in a chair or at the table.¹ This appliance will be much appreciated by all classes of patients. It will be a great acquisition to tuberculous subjects having to remain for all or much of the day in bed, and it will also be most helpful to those who have to sit out of doors or rest in the open. The Refereader is strong, portable, weighs only 26 ounces, and can be folded up into a small compass. The chief features of this novel stand for easy reading will be seen from the accompanying illustration.

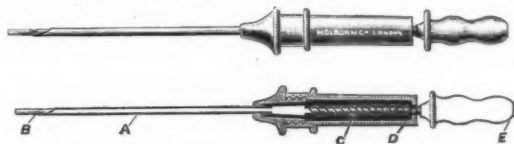


THE REFEREADER.

¹ The Refereader is supplied by Partridge and Cooper, Ltd., 191-192, Fleet Street, E.C. 4. Price 18s. 6d.

A PNEUMOTHORAX NEEDLE.

Dr. Guillermo Zorraquin, of Buenos Aires, has designed a new form of PNEUMOTHORAX NEEDLE,¹ the chief points of which are indicated in the accompanying figure. It is claimed that its chief advantage



THE ZORRAQUIN PNEUMOTHORAX NEEDLE.

is that it automatically indicates to the medical practitioner using it when the cavity is reached. As is well known, in the production of artificial pneumothorax there is a real danger of the lung being damaged by the penetration of the needle. Dr. Zorraquin's needle has been designed in order to provide reliable means whence manometrical data relating to the penetration of a cavity can be obtained, and also to substitute a dangerous, sharp-pointed needle for a safe, blunt one. The instrument is made of steel in five pieces—the perforating-needle; an inner mandrin, hollow, pointless and with manometric, automatic discharge; a manometer spring which discharges the inner mandrin; a spring case screwed to the perforating-needle that serves as the handle of the instrument; and the armour of the inner mandrin, the automatic movements of which demonstrate the presence of a cavity and indicate the situation of any organ.

A SYRINGE FOR TUBERCULIN INJECTIONS.

The annexed illustration indicates the chief features of the WALLER RECORD TUBERCULIN SYRINGE.² It is a strong, simple, clearly marked, effective instrument, and for the administration of tuberculin or like preparations can be thoroughly relied upon.



WALLER RECORD
TUBERCULIN
SYRINGE.

THE IDEAL FOUNTAIN PEN.

A reliable fountain pen is now a necessity for all who for any purpose practise the art of writing. For the doctor and other professionals a pocket pen is indispensable, and for all sorts and conditions of

¹ Further particulars regarding the Zorraquin Pneumothorax Needle can be obtained from the makers, the Holborn Surgical Instrument Company, Limited, 26, Thavies Inn, Holborn Circus, E.C. 1. It is made in five sizes, 7s. 6d. each.

² The Waller Record Tuberculin Syringe is supplied by the Holborn Surgical Instrument Company, Limited, 26, Thavies Inn, Holborn Circus, E.C. 1. Price 15s.

men and women this helpful companion is considered as part of the personal equipment. Patients of every kind, and especially those who have to live an open-air life, cannot get along comfortably nowadays without a good Fountain Pen. And among the many varieties now available we have found none to rival Waterman's IDEAL FOUNTAIN PEN.¹ This can be obtained in various forms, and with nibs to suit every kind of hand. The most convenient for all classes of patients is undoubtedly the self-filling kind. As a present for a sick man or woman nothing can be better. Every Waterman's Ideal is of perfect construction, and the difference in the cost is due to the type or to the size of the barrel and nib. A Waterman's Ideal robs writing of all its drawbacks and makes it the most comforting and delightful of pursuits. This pen is now used for leaders in all parts of the world, and it has been employed in signing the most momentous of documents.

THE HYGIENIC CLEANSING OF ROOMS.

Dust is a menace to human health and happiness. It not only produces discomfort and destruction through its effect on material things, but oftentimes through its mechanical action or as a carrier of microbial agents sets up definite morbid processes. Tuberculosis, it is generally believed, is spread to a large extent through infective dust. On all grounds it is essential that home, school, and all places where human subjects dwell, should be kept as free from dust as possible. And in hospitals, sanatoria, open-air schools, and the like, where tuberculous subjects are undergoing treatment, it is of the utmost importance that means for dealing effectively with dust should be provided. In these days time and labour saving devices are rightly in great demand, and certainly in carrying out dusting they are most desirable. Among simple, inexpensive, and very effective agents now available for facilitating the cleaning of rooms of every kind the first place may well be given to the well-known and justly popular O-CEDAR POLISH MOPS.² When used with the specially prepared O-Cedar Polish this domestic contrivance proves most reliable and saving in every way. The Mops are now available in sizes ranging from 6 inches to 1 inch, and thus can meet every form of requirement. A new FLOOR DUSTER MOP has recently been introduced which promises to be an acceptable addition to the trustworthy housewife's armamentarium. It has been designed to take the place of the ordinary broom. Already it is being used in many hospitals and sanatoria in the United States of America, and only needs to be known here to be appreciated.

THERAPEUTIC AND HYGIENIC PREPARATIONS.

Under the designation of NUMOL there has been introduced an attractive and palatable nutrient, which promises to be of real value in dealing with tuberculous subjects and other patients suffering from

¹ Waterman's Ideal Fountain Pen is supplied by stationers and jewellers everywhere. "The Pen Book," a most interesting compilation, is sent free to those who write for a copy to L. G. Sloan, Ltd., "The Pen Corner," Kingsway, W.C. 2.

² Full particulars regarding the O-Cedar Mop and the O-Cedar Floor Duster can be obtained on application to the Manufacturers, the Channell Chemical Company (of England), Ltd., 18-20, Farringdon Road, E.C. 1.

wasting disorders.¹ For delicate, malnourished tuberculous and tuberculously disposed children Numol should prove very popular. It contains cream obtained from the milk of tuberculin-tested cows, lecithin in the isolated form and guaranteed to contain 98 per cent., hypophosphates in organic combination, carbohydrates and proteins, diastatic ferments and vitamins.

The purveyors of the well-known and much-used Nestlé's Milk preparations are now supplying an excellent form of MALTED MILK, which should be appreciated by tuberculous patients undergoing domiciliary treatment, or in hospitals, sanatoria, or open-air colonies.² The preparation is one which is particularly suitable for tuberculous and delicate children in open-air schools.

ALLENBURYS DIET is a preparation which has been found of much value in nourishing bad cases of tuberculosis and the subjects of other wasting diseases.³ It is an attractive, palatable, and easily assimilated, predigested preparation of milk and wheaten food. No tedious or elaborate precautions are necessary in making the Diet ready for use. It is an excellent food for tuberculous and tuberculously disposed children.

"VASELINE" petroleum jelly is a mineral product which has become popular, not only in dealing with medical cases, but in the everyday hygienic management of men, women, and children. In the preservation of healthy conditions of the skin and in the prevention of various morbid conditions "Vaseline" jelly and its many and various preparations can render notable service.⁴ For use in hospitals, sanatoria, and open-air schools, "Vaseline" preparations are to be strongly commended. "Vaseline" jelly in various medicated forms can now be obtained put up in tubes made of pure tin. In this series it can be obtained in camphorated, borated, and carbolated forms. It is also available in combination with capsicum, eucalyptol, etc.; and there is an excellent analgesic preparation for local application. "Vaseline," yellow and white, petroleum jelly can be obtained in small tins, tubes, and screw-capped bottles. A particularly soothing and softening preparation for the skin is the "Vaseline" Cold Cream, which is put up in dainty, white toilet-table holders.

"IODOLYSIN" is a compound of thiosinamine which is allyl thiocarbamide or allyl sulpho-urea, and is obtained by the action of ammonia upon allyl isosulphocyanide, or oil of mustard. "Iodolysin" is being employed as a fibrolytic agent, and has been of service in certain cases of rheumatism and rheumatoid arthritis. It is best administered in the form of "Kapsol," a gelatine-coated capsule. It seems probable that it may be of service in dealing with some of the arthritic troubles met with in sanatorium cases, especially at this time

¹ "Numol" is prepared by the Numol Company, 3, College Street, Newcastle-upon-Tyne, from which firm particulars and specimens can be obtained by medical advisers on application.

² Nestlé's Malted Milk is supplied by the Nestlé and Anglo-Swiss Condensed Milk Company, 6 and 8, Eastcheap, E.C. 3. Price 1s. 9d. a bottle.

³ Particulars and specimens of Allenburys Diet will be sent to medical advisers on application being made to Allen and Hanburys, Ltd., Bethnal Green, E. 2.

⁴ Particulars regarding "Vaseline" and its various preparations can be obtained on application to the manufacturers, the Chesebrough Manufacturing Company (Consolidated), 42, Holborn Viaduct, E.C. 1.

of the year.¹ A form of "Iodolysin" ointment is now available for use with gentle massage.

A TUBERCULOUS EGG-PREPARED ANTIGEN is now available for the conduct of the sero-diagnosis of tuberculosis according to the formulas of Professor Besredka, of the Institut Pasteur of Paris.²

The DETOXICATED TUBERCULIN and VACCINES supplied by Genatosan, Ltd., are now prepared in the pathological department of St. Paul's Hospital, Endell Street, W., and distributed from the London Branch, 143-5, Great Portland Street.³

The Anzora Perfumery Company are supplying a series of elegant COSMETIC PREPARATIONS—creams for the hair and scalp, vanishing creams for the face, etc.—which will be found particularly serviceable for patients undergoing open-air treatment.⁴

The Maltine Manufacturing Company are supplying a reliable series of Malt and Cod-Liver Oil Preparations.⁵ We have received specimens of two of these. MALTOLINE is a combination of "Maltine" with a tasteless olive oil, glycerophosphates, and fruit juice. It is a palatable nutrient and tonic, particularly serviceable in dealing with cases unable to take cod-liver oil. "Maltine in Powder Form" is a concentrated nutrient powder with a pleasant biscuit flavour. It is convenient for administration to all classes of patients, and is easily assimilated. It is rich in proteids, phosphates, and carbohydrates, and possesses high digestive powers. These preparations will be found of much value in the treatment of tuberculous subjects, and are to be strongly recommended in the management of malnourished, wasting, and tuberculously disposed children.

In the prevention and arrest of tuberculosis the question of nutrition and the practical direction of dietary should have first consideration. Cereals necessarily occupy a foremost place in all scientifically ordered dietaries, and among these oats have long been recognized of special value. Under the designation of "Millennium" OAT-FLAKES there is now available an excellent and thoroughly reliable preparation of oats. Oatmeal is a perishable commodity—that is to say, it rapidly loses its flavour and freshness. It is important, therefore, that it should not be bought and kept loose, but preserved in an airtight packet, so that the contents reach the consumer with the flavour unimpaired and as fresh as when they were packed at the mill. This is secured in the preparation under consideration. The Millennium Oat-Flakes container has a specially prepared lining, so that the contents do not

¹ "Iodolysin" has been introduced by Allen and Hanburys, Ltd., 7, Vere Street, Cavendish Square, W. 1, from whom full particulars can be obtained on application.

² Particulars regarding the Tuberculous Egg-prepared Antigen and the Anti-dysenteric and Galled Anti-typhoid Tablets, prepared in accordance with the formulas of Professor Besredka, and also "Sanogyl" for the treatment of pyorrhœa, etc., and "Sanoram," a general antiseptic introduced by Dr. B. Kritchewsky, can be obtained on application to the Sealand Trading Ltd., Buchanan Buildings, 24, Holborn, E.C. 1.

³ Full particulars regarding the Genatosan Detoxicated Vaccines can be obtained on application to Genatosan, Ltd., 143-5, Great Portland Street, W. 1.

⁴ Full particulars regarding the Anzora Preparations can be obtained on application to the Anzora Perfumery Company, Ltd., 28, 32, 34, Willesden Lane, N.W. 6.

⁵ Full particulars regarding the above preparations, and the whole series of "Maltine" preparations, may be obtained on application to the Maltine Manufacturing Company, Ltd., 9, Holborn Viaduct, E.C. 1. This company also issue to medical advisers a useful series of monthly notebooks.

acquire the unpleasant cardboard flavour associated with cheap packages. The Oat-Flakes are entirely free from husk, are easily digested, and are especially recommended for growing children of all ages. With this preparation delicious porridge can be obtained in three minutes. This quick cooking has been secured by subjecting the oats to partial cooking at the mill by a special process.¹

Patients in hospitals and sanatoria, and indeed sensible folk everywhere, who use a pencil for writing or drawing, should possess one of the "WHITE QUEEN" PENCIL SHARPENERS.² It is a small, compact, portable, pocket companion, always ready to provide a blunt or broken pencil with a fine working point.

Medical Officers of Health, Tuberculosis Officers, and others who are accustomed to discourse to students or to deliver popular lantern lectures, and often require to reproduce on the screen simple charts or diagrams, or reproduce statistical tables and the like, will find the WALTURDAW OPAQUE LANTERN SLIDES of great convenience. These strong heat-resisting glass squares are prepared with a special opaque solution, so that the desired wording or design has only to be scratched on the surface with a pointed instrument, and the plate is ready for projection.³

Many tuberculous and tuberculously disposed men and women are cigarette smokers, and it must be admitted that in a large number of cases the comfort gained by a moderate indulgence justifies the doctor in permitting a continuance of the habit. It is very desirable, however, that quality and quantity should be controlled. The far-famed firm of Abdulla and Co. provide a series of excellent brands which are well suited for delicate subjects and patients who are suffering from pulmonary tuberculosis or other chest affections.⁴

Reference may here be made to the "Abdulla" Almanac.⁵ It occupies a unique position among Remembrancers. The 1922 is of special interest this year. It presents reproductions of a fine series of pictures delineating child life by well-known artists. This handsome timekeeper, with its clear figures, might well have a prominent place in all hospitals and sanatoria.

¹ Full particulars regarding the Millennium Oat-Flakes can be obtained from the makers, W. Vernon and Sons, Ltd., 4, Lloyd's Avenue, Fenchurch Street, E.C. 3.

² The "White Queen" Pencil Sharpener is manufactured by E. S. Perry, 171, Queen Victoria Street, E.C. 4.

³ The Walturdaw Opaque Lantern Slides are prepared by the Walturdaw Company, Ltd., 46, Gerrard Street, W. 1. Price 1s. 6d. per box of twelve.

⁴ Full particulars regarding the various brands of Abdulla Cigarettes may be obtained on application to Abdulla and Company, Ltd., 173, New Bond Street, W. 1.

⁵ The Abdulla Almanac is issued by Abdulla and Company, Ltd., 173, New Bond Street, W. 1. Price 1s. 6d.

THE OUTLOOK.

THE TUBERCULOSIS PROBLEM.

THE Tuberculosis Problem still remains unsolved. The Great War has led to a considerable extension in the ravages wrought by tuberculosis, and has robbed us of much of our means for the conduct of a successful campaign against the foe. The Tuberculosis Movement has undoubtedly suffered a serious setback. Agencies for the early recognition and prompt treatment of tuberculous cases are sadly inadequate. The State Medical Tuberculosis Service has, to a great extent, proved a disappointment, and voluntary institutions providing gratuitous assistance have almost ceased to exist. Even ex-service officers and men who have fallen victims to tuberculosis are, in the majority of cases, imperfectly provided for. Schemes for the development of tuberculosis work are almost everywhere being arrested. All such service as is now supposed to be available is very imperfect. Much of the so-called dispensary and domiciliary and sanatorium treatment which is being provided at enormous expense to the country is little better than a farce. To imagine that thirteen weeks' residence in an institution will accomplish real and permanent benefit for an advanced case is to live in a fool's paradise. Sanatorium treatment as now generally conducted has been shown to be of but limited service. It is necessary to remember that no measures for the arrest of tuberculosis are likely to accomplish much so long as tuberculous and tuberculously inclined children are allowed to remain neglected. There are many causes besides lack of financial resources which are hindering and hampering progress. Little enthusiasm exists for the conduct of scientific research regarding medico-sociological aspects of tuberculosis. Large sums of money are expended in publishing the reports of tuberculosis officers, but in most cases these are only of local interest, and are of no real scientific value. The instruction of medical students and practitioners as regards tuberculosis is extremely meagre. Tuberculosis officers are usually appointed without presenting evidence that they have received adequate training. No systematic courses of post-graduate instruction for panel doctors and other medical practitioners are provided, although the all-important early recognition of tuberculosis in most cases must devolve upon the panel or private doctor. The existing compulsory notification of tuberculosis is imperfectly carried out, and not infrequently no intimation of the existence of such a case is provided until the patient is dying. If a successful tuberculosis service is to be maintained in this land the general practitioner must be afforded proper opportunities for instruction in regard to the early diagnosis and scientific treatment of tuberculosis in all its forms. Tuberculosis officers should also be able to advance their knowledge by attendance at suitable post-graduate courses at home and abroad. It is well known that much restlessness and discontent exists among many members of the tuberculosis service, and it is evident that there are numerous factors to discourage them in their efforts to maintain a high standard of efficiency. The fact is, in

all departments of tuberculosis work there is an urgent need for a complete, comprehensive, and judicial inquiry into the medico-sociological aspects of the tuberculosis problem as it exists in this country. For some years we have earnestly advocated the holding of an investigation where all available data could be studied by those capable of evaluating evidence without prejudice or a bias born of regard for vested interests. A year ago¹ the following appeared in this journal: "Before the Ministry of Health proceed further in the development of complicated and expensive schemes aiming at the prevention and arrest of tuberculosis, many are desirous that a Royal Commission or Inter-Departmental Committee should be appointed to consider the tuberculosis problem in all its bearings. War and post-war experiences have thrown new light on this problem, particularly in its relation to other medico-sociological problems. Existing financial conditions are compelling us to investigate all services relating to organization and administration of measures seeking the prevention and treatment of tuberculous disease in order to ensure that competency, economy, human sympathy, and a scientific spirit shall be manifest in all." We once more urge the importance of the appointment of a Royal Commission to study the tuberculosis problem as it exists in this country.

TUBERCULOSIS IN THE CHILD.

Sir George Newman, in his last report as Chief Medical Officer of the Board of Education, provides a special section on "Tuberculosis in the Child."² Suggestive figures are reproduced and views are expressed regarding the channels of infection and the action which should be taken to secure protection: "The means of infection are twofold—inhalation and ingestion. . . . The broad lines of prevention are therefore clear. We must preserve the child from infection by tuberculous persons, whether expectorating or not, and we must restrict, and if possible stop, the consumption of tubercle-infected milk." It is also very rightly urged that school medical officers and tuberculosis officers should address themselves to a consideration of the two far-reaching issues of individual resistance and immunity. As regards the treatment of tuberculosis in children, the following four broad lines of action are defined: (1) We must build up the resistant powers of the child and make the body sound and healthy, so that the invading tubercle bacillus is kept dormant or is defeated; (2) we must reduce, and if possible prevent, new infection, either in massive doses or in smaller doses frequently repeated or prolonged; (3) we must improve the domestic and sanitary environment of the child, including housing, a tubercle-free milk supply, the open-air life, nutrition, education in hygiene; (4) we must deal with the tuberculous child and the child predisposed to the disease. Lists are given of the various day and residential schools for children suffering from pulmonary tuberculosis and other forms of the disease.

¹ See *British Journal of Tuberculosis*, vol. xv., No. 1, January, 1921, p. 51.

² "Annual Report of the Chief Medical Officer of the Board of Education, 1920." Pp. iv+223. London: His Majesty's Stationery Office, Imperial House, Kingsway, W.C. 2. 1921. Price 6s. net.

ANTI-TUBERCULOSIS INSTRUCTION.

Educational propaganda is one of the surest and most scientific agencies for the advancement of a movement. During war days



"THE SPIRIT OF THE DOUBLE-BARRED CROSS."

propaganda was developed as a fine art. To arouse interest and provide information in anti-tuberculosis endeavours it is of the utmost importance to arrange for the enlightenment of all classes of the com-

munity. During these difficult after-war times anti-tuberculosis propaganda has been allowed to lapse. This is most unfortunate. Not only should the parent in the home, the scholar in the school, the student in college, and the worker in factory or workshop, be impressed with the importance of a loyal co-operation in maintaining measures which shall make for the prevention and arrest of tuberculosis, but the attention of the man in the street should be gained. We spend enormous sums of money in patching up patients permanently enfeebled or crippled by tuberculosis and in providing institutions for hopelessly diseased tuberculous men and women, but little is done to provide our present citizens and our future citizens with that knowledge which may lead to the wisdom which, after all is said and done, is the surest safeguard. There are hoardings in almost every street on which appear wonderful, artistic, ephemeral, and oftentimes misleading advertisements, and city halls and churches and schools and libraries and other public places usually possess notice-boards on which attractive and instructive anti-tuberculosis placards could be exhibited. We might learn much regarding the science and art of anti-tuberculosis propaganda from the work of our American cousins in the United States, and the fine service rendered by the American Red Cross in France and other parts of Europe. As an excellent example of what can be done by attractive journalism, we would direct attention to the *Journal of the Outdoor Life*. This is an American monthly publication issued in the interests of the Anti-Tuberculosis Campaign.¹ Through the courtesy of the editor we are permitted to reproduce a picture which appeared on the front of the cover of a recent number. Such an illustration as "The Spirit of the Double-Barred Cross" might well be used in connection with propaganda work. We would suggest that the National Association for the Prevention of Tuberculosis would be rendering a far-reaching service to the British Commonwealth if it could develop a Popular Educational Anti-Tuberculosis Propaganda. We shall be glad to receive expression of the views of our readers regarding the most approved methods for the spread of reliable knowledge as to ways and means whereby the scourge of tuberculosis may be opposed.

NOTES AND RECORDS.

At the Royal Institute of Public Health, 37, Russell Square, W.C. 1, a course of lectures on tuberculosis and public health will be delivered on Wednesdays at 4 p.m. as follows: January 11, "The Organization and Administration of a Tuberculosis Service," by Dr. H. Hyslop Thomson. January 18, "The Influence of Light and Air in the Prevention and Cure of Tuberculosis," by Dr. C. W. Saleeby. January 25, "Laboratory Aids to the Diagnosis of Tuberculosis Infection," by Dr. A. C. Inman. February 1, "The Virulence of Tuberculosis Bacilli and the circumstances under which it may vary," by Dr. A. Stanley Griffith. February 8, "The Role of the Three Types of Tubercle Bacilli in Human and Animal Tuberculosis," by Dr. Louis Cobbett. February 15, "The Success and Failure of Sanatoria Treatment," by Dr. Marcus S. Patterson. February 22, "Industrial

¹ The *Journal of the Outdoor Life* is published monthly in the interests of the Anti-Tuberculosis Campaign in America at 370, Severelle Avenue, New York City, U.S.A. Annual subscription, \$2.00; single numbers, 25 cents.

Colonies and Village Settlements for the Consumptive," by Dr. P. C. Varrier-Jones. March 1, "Surgical Tuberculosis in Children," by Dr. Charles E. M. Jones. March 8, "The Clinical Differences in the Course of Tuberculosis seen in various Age-Groups and Races," by Professor S. Lyle Cummins, C.B., C.M.G. March 15, "The Organization and Conduct of Tuberculosis Dispensary Work," by Dr. W. H. Dickinson, O.B.E. March 22, "The Helio-Alpine Treatment of Surgical Tuberculosis," by Mr. Andrew J. Morland. Medical officers of health, tuberculosis officers, medical practitioners, sanitarians, medical students, and all men and women engaged in any form of public health service or interested in the medico-sociological problem of tuberculosis, are invited to attend. No ticket of admission is required.

A second and mid-winter International Post-Graduate Course in Heliotherapy is being held by Dr. Rollier and his colleagues at Leysin, January 10 to 14. There is no fee, and medicals visiting Leysin are provided for at the nominal inclusive charge of 10 francs a day. British tuberculosis officers and all other medical advisers having to deal with tuberculosis cases should make a point of visiting Leysin. Particulars can be obtained on application to Dr. Rollier, Les Frères, Leysin-Village, Switzerland.

A course on orthopædics will be held by Dr. F. Calot, chief surgeon to the Hôpital Rothschild, of the Institut Orthopédique de Berck, at his Paris clinic from January 23 to 29, from 2 p.m. to 7 p.m. daily. The course is designed for medical men and students, native and foreign, and demonstrations in English and Spanish will be given. The fee is Fr. 150. A detailed programme and other information can be obtained from Dr. Fouchet, Institut-Calot à Berck-Plage, or from Dr. Collew, Clinique-Calot, 69, Quai d'Orsay, Paris.

The Tuberculosis Society has arranged for the following fixtures: January 23, Consideration of the Report of the Sub-Committee on Classification of Tuberculosis; February 27, Tuberculosis and X-ray Work; March 27 will be a Clinical Meeting; April 24, The Therapeutics of Tuberculosis; May 22, The Relationship of Dispensaries and other Institutions for Tuberculosis. On June 26 there will be a Provincial Meeting, probably at Bristol. Meetings of the Society are held at the Margaret Street Hospital for Consumption, Margaret Street, Regent Street, London, W., at 7.30 p.m.

PUBLISHERS' NOTICE.

The Publishers of the "British Journal of Tuberculosis" are desirous of purchasing a limited quantity of back numbers. For particulars as to dates, etc., see page xiv.